The Journal of comparative medicine and surgery

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THE JOURNAL

OF

COMPARATIVE MEDICINE AND SURGERY,

A QUARTERLY JOURNAL

OF THE

ANATOMY, PATHOLOGY AND THERAPEUTICS OF THE LOWER ANIMALS.

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VOLUME III.

NEW YORK:
WILLIAM R. JENKINS,
PUBLISHER, BOOKSELLER, STATIONER AND PRINTER,
No. 850 SIXTH AVENUE.
1882.

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THE JOURNAL

OF

COMPARATIVE MEDICINE AND SURGERY.

VOL. III. JANUARY, 1882. No. 1.

ORIGINAL COMMUNICATIONS.

ART. I.—THE STUDY OF COMPARATIVE PATHOLOGY: INTRODUCTORY LECTURE OF A COURSE, DELIVERED AT THE COLUMBIA VETERINARY COLLEGE, IN 1881–82.

BY THOMAS E. SATTERTHWAITE, M.D.

WE commence, to-day, gentlemen, the study of Comparative Pathology, the precise meaning of which I shall first endeavor to explain to you.

You know that Physiology, as we study it in animals, teaches us about the various activities of the bodily parts, while they are in a healthful condition. But, supposing that we are desirous of studying any form of abnormal or unhealthful activity, it is to Pathology that we turn, as the department of medicine that is calculated to give us the needed information.

Comparative Pathology is merely that broad and comprehensive field, that includes not only the whole range of abnormal animal life,

but, I may truly say, the vegetable as well. I should hardly dare to say, that it is my purpose to enter and traverse with you this almost boundless field, but I will say that it is intended, in this course of lectures, to introduce you to that most useful part of it, which includes a combined study and comparison of those morbid manifestations in men and animals that are, in some measure, common to both. This particular department or division of Pathology is also, I may say to you, a somewhat new one, but one which is, nevertheless, destined to assume great importance, so that I have ventured to think it will mark an era, brilliant in novelties, and full of important discoveries, that may elucidate hidden principles of disease, and indicate the direction our efforts are to take in combatting them more successfully than heretofore. To this point reference will again be made.

I think it well, at this time, also, to guard you against the possible error of mistaking Pathological Anatomy for Pathology, as is sometimes done. The former, in its pure sense, is only the substantial framework on which the edifice of Pathology is being reared. It takes cognizance of all the alterations of form, size, shape, color and consistency, as they have been and are observed by the naked eye.

Until the discovery of the compound microscope, a classification founded on such distinctions, was very useful, but with the rise of Pathological Histology, so many new types of disease were recognized, that the entire classification had, in a great measure, to be re-cast. Now, it is upon this standpoint of Microscopic Anatomy that the present scientific position of Pathology chiefly rests. To Physiology it owes less, though it is proper to admit that there are, and always will be, probably, certain classes of abnormal activities not associated with any structural change. It is in such cases that we turn to Physiology, as the only branch of our science that is competent to explain them. True Pathology, therefore, bases itself on these three fundamental studies; indeed, without them it has no proper existence. Its development, accordingly, is to be sought in the gradual growth of these collateral branches.

With the ancients the whole subject was a matter of speculation. It is true that feeble efforts were made, from time to time, to discover the hidden springs of disease, as may be gathered from the writings of Aristotle; but so many restrictions were placed upon the dissection of human bodies, that information was chiefly derived from

examining the lower animals. Alcmeon, who flourished in the sixth century (B.C.), and Democritus, who lived in the third and fourth century (B. C.), obtained their knowledge chiefly in this way.

Real progress became possible only during the supremacy of the Alexandrian school, in Egypt, under the Ptolemies, for then systematic post-mortem examinations were allowed and even encouraged. Prominent among the anatomists of this time were Erasistratus, of Ceos (born 300, B. C.) and Herophilus, of the same epoch, while Parthenius, somewhat later (200, B.C.), even published a book, entitled "On the Dissection of the Human Body." With the decline in learning and the associated restrictions again put upon human dissection, anatomy experienced a rapid fall, and Galen (born 131, A. D.) was obliged to conduct his studies on monkeys, or, secretly upon the bodies of persons found murdered, or on such others as came accidentally into his hands.

But a change was destined to take place, and the first substantial signs of it were indicated by Mundinus, of Milan (born 1315). He made public demonstrations of human anatomy, and published a text-book which was used in the Academy at Padua for two hundred years and more. But it was not until the sixteenth century that Pathology began to assert for itself the position it was destined to take at a later day.

It was then that Benevieni, a Florentine physician, wrote a book (1507) entitled "De Abditis Nonnullis Ac mirandis Morborum et Sanationum Causis." With the revival of learning that characterized this century, many important advances were made in anatomy, and Sylvius (Jacques du Bois), appointed professor in the Royal College of France in 1550, and Vesalius, a Flemish physician, of about the same time, published important contributions to human anatomy, laying substantial foundations for subsequent discoveries and demolishing many errors that had been tacitly received and accepted as truth since the time of Galen.

It is common, however, and just, to associate with the name of Morgagni, of Padua, the foundation of Pathology as a science. His well-known work "De Causibus et Sedibus Morborum per Anatomen Indagatis" (1761), translated into many languages, led to his being ranked universally as the most prominent pathologist that had yet appeared, though he was largely inspired by his predecessor, Bonet, who had collected (1675) the records of three thousand post-mortem examinations during a period of two thousand years, and

who was himself inspired by Baillou and others. Previous to this, Harvey in his famous manuscript, "De Anatomia Universali" (1616), had indicated the doctrine of the circulation, to the elucidation of which he had undoubtedly been instigated by the zeal of his former master, Fabricius ab Aquapendente.

And yet, in strict justice it should be said that Cæsalpinus (born in 1519) had already described the systematic circulation in his *Speculum Artis Medicæ Hippocraticum*, while Cecco d' Ascoli, also an Italian, had foreshadowed it in the preceding century (1473). Indeed, previous to the birth of Harvey, the pulminary circulation had twice been described, once by Michael Serseties, the Spanish author and physician, in his *Christianism's Restitutio*, completed in 1546, and a second time by Realdus Columbus, a few years later, in *De re Anatomica*, and yet there is abundant reason to presume that each one of the authors reached his conclusions independently; Harvey, who gives credit to Fabricius, being alone excepted.

I should not omit to consider the vast influence at this precise epoch of the great French philosopher and naturalist, René Descartes (b. 1596). One of the founders of modern philosophy and metaphysics, and directing human thought in a way that is difficult to conceive, he still found time to labor in every department of physical science and made contributions to physiology that have entitled him to rank in France with Harvey in England. It was his merit to seek an explanation of all vital processes in simple and universal laws applicable alike to plants, animals, or any mechanism. He taught that we should apply to all operations in the animal frame the ordinary rules of physics. It is needless to say that these fundamental ideas are incorporated into the physiology of to-day.

Borelli, born in Naples in 1608, followed out the pathway thus opened and applied the higher mathematics to medical science. His researches on the actions of muscles and on the bones as levers, have left him an immortal reputation. Incidently he made some pathological contributions of no mean value.

But while pathology was thus prepared to take advantage of a suitable moment to make another prominent step, it remained for Leeuwenhoeck to open up the field in a positive manner. Bending his attention to the making of microscopes, he so increased the magnifying power of the simple convex lens that he was enabled to discover (1671) the red blood globules and spermatozoa, tracing out their characters in various birds, fishes and reptiles. These discoveries

were soon extended by his followers, who still further improved upon his lenses and were rewarded by exposing new facts in natural science.

We see, then, how much pathology has had to depend upon the collateral branches of medicine and how true it is in this department of natural science, as in others, that there is a sort of inter-dependence, and one has to wait upon the other, in effecting its own gradual development.

And now, again, the work was taken up by physiology, for to Bichat must be accredited the next great impulse. He died, unfortunately, too early for medical science, leaving an unfinished work on pathology and pathological anatomy, for which he had the greatest taste, and in which he was so successful a teacher, that he has been called "the Morgagni of France." But he accomplished what at that time was more needed—the grounding of some physiological laws that will always remain in force.

To him animal life was the product of separate, and to a certain extent, independent actions. Disease might, therefore, attack certain portions of an organ, but not affect its functional activity to a notable degree. The doctrine of these associated but separate activities in an organ had not been appreciated up to this time.

But you are not surprised to know that the most positive advances in Pathology have been made in very recent times. They are almost wholly connected with the revelations of a single instrument, the compound microscope, that only acquired a proper amount of perfection during the third quarter of the present century. Its teachings, with the associated application of chemical science, have effected a genuine revolution, and established Pathology upon a broad, sound and generally accepted basis. And this is all mainly owing to the influence of a single man, Rudolph Virchow, who lives to-day. He developed the theory that all animal life resides in physiological units (cells), and that to appreciate the actual conditions of disease, we must study them and their relations. This idea permeates all his writings, and is recognized as the modern basis of investigation in all countries. His classifications of disease, taking cognizance, as they do, of these form-elements, are almost universally accepted, and are destined to form a working basis for some time to come. And now, to quote from Huxley, in his address at the last International Congress in London, matters stand thus: "Accurate anatomy has rendered practicable the exploration of the most hidden parts of the

organism, and the determination, during life, of morbid changes in them; anatomical and histological post-mortem investigations have supplied physicians with a clear basis upon which to rest the classifi cation of diseases, and with unerring tests of the accuracy or inaccuracy of their diagnosis. If," he continues, "men could be satisfied with pure knowledge, the extreme precision with which, in these days, a sufferer may be told what is happening and what is likely to happen, even in the most distant parts of his bodily frame, it should be as satisfactory to the patient as is is to the scientific pathologist who gives him the information."

It is fortunate for us, perhaps, that the distinguished physicist is not a practicing physician, else we might call him to account for expressions which seem a trifle extravagant; but this much we may fairly say: Many pathological prognoses of the present day have reached a degree of accuracy that is almost mathematical. This is true, more especially, in the domain of neoplasms, or tumors, as you may call them; while, on the other hand, the application of organic chemistry, to the determination of the constituents of suspected fluids and liquids, introduces the precision of the chemical laboratory.

And now we come to another topic, which, after all, is the main one before us, the pathology of diseases in the lower animals, such as the horse, the cow, the dog and the fowl. Now, I have already said that when these topics are taken up and scientifically considered, a new era will be opened for Pathology. Its influence will also be felt in the whole domain of medicine. Indeed, I am not alone in holding this view and making it public.

In a recent address before the Pathological section of the recent International Congress in London, the venerable President insisted that the field of Pathology must be made to embrace all diseases in all animals and in all vegetables. He urged that a comparison between diseases in men and animals may throw much light on their nature, as, indeed, the discussions on hydrophobia, as compared with the rabies, vaccinia compared with variola, have served to elucidate both the human and the animal disease, by calling attention at once to their similarity and distinctiveness. Human Pathology should really have its basis in the comparative, a wealthy mine which has hardly been worked at all. Indeed, Samuel Wilks, in his address, quotes the historian Buckle, who, in his "History of Civilization in England," has said: "The best physiologists distinctly recognize that the basis of their science must

include not only the animals below man, but also the entire vegetable kingdom, and that, without this commanding survey of the whole realm of organic nature, we cannot possibly understand even human physiology, still less general physiology. The pathologists," he further states, "are so much in arrear, that the diseases of the lower animals scarcely form part of their plan, while the diseases of plants are almost entirely neglected, although it is certain that, until all these have been studied, and some steps taken to generalize them, every pathological condition will be empirical, on account of the narrowness of the fields from which it is collected."

But it is not to be inferred that Comparative Pathology is a new department altogether, for some scattered work has been done in it.

Among the first, however, who deserve prominence is Jenner, whose experiments on cows led to the introduction of *vaccination*, by which thousands upon thousands of human beings have been saved a fearful and fatal malady, or a life long disfigurement. Hearing from a milkmaid that she felt herself protected against the human disease because she had contracted cow-pox, he pursued the study of this matter in Gloucestershire, and succeeded in finding that there was a peculiar pustular eruption of the cows (there being many eruptions quite similar in appearance) that really protected against small pox. So satisfied did he at length become that the matter was demonstrated, that he experimented upon his son, then a lad less than six years of age.

The advantage of this discovery to the human race may be estimated when we consider that prior to vaccination the mortality in some parts of England was 96 per 1,000, while afterwards it was reduced to less than one-third that amount, and in counties where vaccination became compulsory the mortality actually fell as low as ten and even two per 1,000 souls.

Now, it is singular that physicians never carried out this idea farther, and failed to examine and see whether they could not counteract the virulence of other contagious or infective diseases by inoculating the patient with a virus that would produce the disease in a modified form; and it seems to have been left for the veterinarians, again, to have the honor of having counteracted disease, prolonged life, and diminished the annual losses to the country by experiments in Comparative Pathology.

Before, however, I give the tribute to Toussaint, Pasteur and his follow workers which I believe they fairly merit, let me add that it is

perhaps to a physician of this city that we owe the credit of having first made an allied series of experiments, though with a totally different object. These experiments and their practical results were not published, however, until after those of Pasteur, but they are still worthy of recognition. Observing that in certain portions of South America the negroes were prone to die of consumption and a rapid form of it, he conceived the idea of vaccinating them, as it were, with tuberculous matter, thus ensuring them the disease, but this peculiar matter he had first carried through a series of calves, so that the poison was robbed of its excessive virulence. He thus claims to have, by inoculation or vaccination, secured to the negroes an immunity against the fatal form of consumption. This gentleman is Dr. Wesley Miller, of this city. The other topics I shall allude to are those of chicken cholera and splenic fever. Pasteur seems to have found that the ravages of these diseases may be checked by inoculating the animals with a so-called modified virus. Pasteur informs us that he has taken the splenic poison from a chicken, and after introducing it into a vessel, taken a similar amount of fluid from this, and so on with a third until he has diluted the original virus, say 100 times. This fluid then, by inoculation upon healthy chickens, has caused a modified disease which was not fatal, and protected against the original disease. The same thing was done with the splenic fever virus. Now, to prove that he had accomplished this result, fifty sheep were placed at his disposal, and twenty-five were vaccinated. Two weeks afterwards the whole fifty sheep were inoculated with the most virulent anthrax poison. The twenty-five vaccinated sheep resisted the disease, but those that had not been inoculated died of splenic fever within fifty hours. The demand for such treatment accordingly was very great, and in less than twenty days 20,000 sheep and many cattle and horses were inoculated. Pasteur seems to have been antedated in his work by Colin and Toussaint and Burdon-Sanderson, but the work was never done before on so large a scale. It is now an important matter to know how long such inoculation will secure immunity.

It is said that at least five diseases of animals are thus capable of being counteracted by inoculation. But enough of this question at the present time. Let us turn to another disease of the lower animals that is communicated to man. This is, I assure you, gentlemen, a topic that is full of novelties and very little understood by even able and competent human physicians.

Let me read you a letter from Dr. Wesley Miller on this point:

"JULY 27th, 1881.

"DEAR SIR:

"More than forty cases of scarlet fever having appeard at Keswick, in England, the medical officer traced their cause to a dairy from which the infected families received their milk. A single case had been brought to a house next to the dairy. The English are nearer to a successful solution of the problem how to deal with infectious diseases than we, in that almost every town and village has its medical officer, who is obliged to trace the infection to its originating cause; if possible, to isolate all cases of contagious fever; and, no matter what the rank of the patient, to compel the abandonment of the house in which the case has occurred, and its thorough disinfection. In all these actions he has the law to sustain him. With regard to typhoid and scarlet fever, both lately have been repeatedly traced to dairies. Exactly how the poisonous germs are communicated through the milk has not yet been discovered, but of the fact that they are so disseminated through the whole neighborhoods there can be no doubt.

"I am, very respectfully, your humble servant,

"W. MILLER.

"DR. T. E. SATTERTHWAITE,

"50 East Thirty-first street, New York."

Now, if any of you gentlemen were to turn to an excellent and recent publication on Diphtheria, you would find it stated there that "garget" or caked bag in the cow, in some one of its forms, is claimed to have given rise to diphtheria in the human species. This matter has provoked much discussion in England. But the following case furnishes more direct evidence of the way in which the contagion may originate. I take the liberty of introducing these annotations from the above medical book because I am not able to consult the original.*

In the winter of 1875–6, every new-born calf in a certain district of Germany died of a disease that exhibited the following symptoms:

More or less abundant salivation, yellow or greenish discharge from the nostrils, swelling of the cheeks, cough and sometimes diarrhœa, ulceration of the cheeks, tongue, palate, nasal fossæ, larynx, bronchi, and intestines, ulcerations about the feet, caseous deposits in the lungs, and commencing pleurisy. Otherwise nothing abnormal. A healthy calf was affected, after being brought in contact with the diseased ones; adult animals not so. But the superintendent

* A Treatise on Diphtheria. By Dr. A. Jacobi. New York, 1880.

of the farm and the woman who attended the calves were taken with angina.

It is well-known that a number of veterinarians regard the epidemic and catarrhal fever of the bovine race as diphtheritic.

Birds are also said to be similarly affected, and mention is made of a parrot that died of tracheal croup, the obstruction resulting from an accumulation of aspergillus, fibrin, and corpuscles. According, also, to Friedberger's report to the Veterinary Society of Munich, there is a croup and diphtheria of the domestic fowls. The thorax, mouth, and larynx, nares, cella-infraocularis, conjunctiva, cornea, sclera, and upper portions of the intestines are affected as in the human subject, while there is a tendency to destruction of the eye. The course of the disease is slow, lasting several months, and the mortality, especially among pigeons, is great.

Nicati studied an epidemic amongst hens, which had similar symptoms to the disease in man then prevailing in the place.

In the *Medical Record*,* of this city, is to be found the notice, that in a house where five children were sick with diphtheria, three kittens took the disease and died. At post-mortem examination, diphtheritic exudations were found in their throats.

These citations are sufficient to show you that there is quite probably a causal rather than a casual relation between these epidemics in mankind and the domestic animals.

You have drawn from what I have said, that the study of human pathology will form part of our scheme. Indeed, man must always be the type for studies in pathological anatomy. It is not only that we have studied his diseased tissues more carefully, but we have a more complete record of the clinical phenomena in his case than can ever be hoped for in comparative medicine. When animals learn to think and talk, we shall be prepared to see them rival man; until they do so, we never shall have a record of their subjective symptoms; their hopes and fears, joys and sorrows, all of which, as you readily conceive, enable us always to have a more complete understanding of any particular malady.

Comparative medicine has, it must be said, among its honored names, those who are universally recognized wherever medicine is practised.

Bouley, Chauveau, Davaine and others, who have traced the origin

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* *Medical Record*, Nov. 8, 1879.

of malignant pustule in man to the carbuncular diseases of animals, have left an impress on the literature of the times. On the other hand, the German veterinarians have enriched human medicine by their researches on trichinosis, the "hydatid" diseases, the "measles of swine," glanders, farcy and hydrophobia, which all come within the proper domain of the veterinary art.

You can realize, therefore, that comparative medicine, whose far-reaching importance I have not even outlined, is not merely broad but affords a greater variety of interesting studies than any other department of medicine.

But in the field of investigation there is still much to be done. You have not only to look anew into pleuro-pneumonia in horned cattle, hog cholera, trichinosis, glanders and hydrophobia, but the whole realm of parasitic disease, whose sway is literally boundless.

So important are these matters now to the country at large, that both the state and general government are having special investigations carried on by paid experts in veterinary medicine. They have expended and should spend adequate sums of money upon them, for they require special training on the part of the investigator, much nicety of manipulation, and the aid of the most modern instruments of scientific precision.

Now you may say to me, How shall we study pathology? I say, first, "make all the post-mortem examinations possible." The mere reading of diseased appearances in books is time thrown away. They can only be appreciated by the eye, which, after taking in the general effect, gradually rejects the immaterial or accidental, and sees underneath the change of color, texture and outline, the really distinctive points that indicate the special lesion.

The great John Hunter, one of the early veterinarians, was a diligent student of comparative anatomy and medicine. This wonderful man, who has been ranked as the "greatest figure in the annals of medicine next to Hippocrates," devoted himself to comparative anatomy during his whole life. He found time to dissect five hundred animals, and even furnished a description of three hundred.

Emulate, therefore, his great example, and never give up the dissection of animals. Such examinations help also to rivet upon your mind the connection between symptoms that have been observed and the morbid states, and in a way that no other method can.

You should also devote yourselves to practical Histology, as I have

already indicated. By such a course, only, can you fit yourself to understand the changes that are brought about by disease.

You must realize the full importance of the discovery that tissues are mainly composed of elements called "cells." "The body (I quote from Huxley) is a machine like an army—each cell is a soldier, an organ a brigade, the central nervous system, headquarters and field telegraph, the alimentary and circulatory system, the commissariat. Losses are made good by recruits made in camp, and the life of an individual is a campaign, conducted successfully for a number of years, but with certain defeat in the long run. The efficiency of an army at any given moment depends on the health of the individual soldier and in the perfection of the machinery by which he is led and brought into action at the proper time; and therefore, if the analogy holds good, there can be only two kinds of diseases—the one dependent on abnormal states of the physiological units, i. e., cells; the other, on perturbation or disturbance of their co-ordinating and alimentative machinery."

Still, as stated by Huxley, it is not a study of the cells alone that explains all abnormal phenomena in the body. There are many morbid actions which do not reveal any structural change; hence true Pathology should not maintain that this condition is absolutely necessary.

While, therefore, I recommend you to study the use or uses of the microscope, and assure you that without it you can never be able to understand the scientific medicine of to-day, I do not wish it understood that I think it important for you to study it exhaustively. Any one and all of you can devote such time to it as and ordinary medical student has at his disposal, and he will obtain all the essential points of information that an ordinary practitioner should need to have.

You may ask what I have to say about vivisection. Let me assure you that we, in this country, are never likely to have any hindrance put in the way of our learning what is desirable that we should know from experiments on animals. Fortunately for us physicians, this matter has been taken out of our hands by our national and state authorities, who fully realize the vast importance of scientific experimentation, and will, therefore, protect scientific men in their legitimate pursuits.

Needless cruelty to animals would never, I am sure, be more severely punished than by those who are heartily devoted to the study or practice of medicine.

In conclusion, let me urge upon you to try to retain in your minds all the facts which you have observed. They can never be displaced; but new theories are apt to have short terms of existence. Our text-books and our periodicals are full of them; but of them I say beware. "Prove all things"—that is, turn them over in your mind, and reject them as soon as they fail to stand the tests of logic or experience.

ART. II.—THE CONTAGIOUS DISEASES OF DOMESTIC ANIMALS.*

BY EZRA M. HUNT, M.D.

The degree to which the diseases of animals are now attracting public attention has many foundations of propriety and necesity. If it were only that their sufferings and their wants appeal to our sympathy, and have claims upon our care, that appeal ought to secure some intelligent attention to their ailments. But they have become more intimately associated with us, in a scientific and practical sense, by the revelations and advancements of modern science. Biology compels us to include all life, and all its limitations, in our studies. Physiology and pathology, as applied to the whole animal world, indicate that the old recognitions of a comparative anatomy were but feeble expressions of those laws of symmetry which, in similarities and dissimilarities, in health and in disease, make the comparative study in physiology and pathology of still broader import.

Professor Flowers, in his address at the opening of the anatomical section of the late Congress, speaks of the "great revolutionary wave which has changed the whole aspect of biological ideas, borne onward mainly by the enormous advances in our knowledge of zoology, comparative anatomy and embryology."

Comparative physiology was sure to become a prominent study so

*Paper read before the American Health Association, Savannah, November 29, by Ezra M. Hunt, M. D., Secretary of State Board of Health, N. J.

soon as we learned that the study of function is fully as important as that of structure.

Buckle, in his History of Civilization, says; "The best physiologists distinctly recognize that the basis of their science must include not only the animals below man, but also the entire vegetable kingdom, and that, without this commanding survey of the whole realm of organic nature, we cannot possibly understand human physiology, still less general physiology."

It is inevitable that comparative pathology must embrace all the diseases of animal and vegetable life. Sir James Paget, in his address some months since on elemental pathology, traced the comparative diseases of plants and trees and morbid growths thereupon in a way that showed how in this sphere we have much to learn. Dr. Wilkes well says the comparison of disease in men and animals may throw much light upon its nature; and it is remarkable that so few persons have been stimulated to the work by considering the long controversy which has taken place as to the relation between vaccinia and variola or hydrophobia and rabies. A true human pathology should have its basis in comparative pathology. Here lies a "mine of wealth but little worked." It is evident that in all these directions there are demands for the closest study and comparison.

But to the disciples of prevention and the health publicist there are inducements and obligations additional to these. Many of the diseases which it is our duty to prevent are derived or derivable from animals.

The list furnished by Professor Law to the National Board of Health names ten contagia and twenty-two parasites common to man and animals, besides fifteen parasites causing enzootics in animals.

Dr. Charles Cameron, Chairman of the Health Section of the late English Social Congress, says: "Recent discoveries show the enormous importance of the study of comparative medicine and pathology. It is only by such knowledge that preventive medicine can be most rapidly and surely advanced."

There is not merely the incidental fact enlarged ubon by Ernest Hart when he tabulates fifty typhoid epidemics, fourteen of scarlatina and seven of diphtheria as somehow having their origin through milk supply.

Tuberculous disease is now claimed to be transferred by milk from

animals to man, as well as the foot and mouth disease so much dreaded in England. Forms of anthrax and splenic fever and erysipelas, and perhaps some forms of boil, carbuncle and skin diseases, depend on specific conditions of diseased meat.

Some allegations have also been made as to ill effects from the flesh of so-called hog cholera disease and as to lard made into butterine therefrom.

It becomes our duty to prevent disease in the lower animals if only to prevent their transfer to mankind. The prominence which the study of parasitic diseases has very properly assumed attaches to this study a vast importance.

Dr. Cobbold, the eminent helmintologist, has catalogued upwards of 200 specimens in the Museum of the College of Surgeons, London, in order "to show every parasitic animal that can affect the human body, and a selection of the principal types of those that inhabit the lower animals, especially such species as are associated with man."

To these we are constantly having additions, as in the new nematode discovered by Bastian in the case of the boy who was at first supposed to have died of typhoid fever on the training ship Cornwall.

So impressed have not only professional men but the public become with the liabilities to various diseases that may occur through the flesh or milk of animals, that there is still another view that presses itself upon our attention.

There is no class of ailments from which the individual is so helpless to defend himself, and hence governments are striving to find out the extent of such maladies and the means for their limitation and extinction.

Already, as we are well aware, the subject comes up as a great commercial question and as involving great economic considerations as to food supply.

No one can witness the rigid inspection now being had in England of all foreign cattle and sheep and the interdiction which has so fallen upon American swine, as almost to banish its live stock from foreign markets and to affect the trade in hams and salted pork, without realizing that the question has assumed importance which alike, in the interests of health and of trade, deserves the closest attention of all sanitarians.

Great Britain imports 5,250,000 cwt. annually.

In the present paper we propose to refer to most of these various diseases with only brief allusions.

Foot and mouth disease has, fortunately, not planted itself upon American soil. In the cases alleged to have come from our ports, Dr. Lyman, the chief veterinarian of the Agricultural Department, has been able to show that they were not American cases, but two bulls and eight heifers sent from England. They were promptly quarantined, and no spread among our cattle occurred. Yet because of the degree to which this disease, if imported, would affect our meat, and still more our milk supply, it is incumbent upon us to take all proper means to secure its exclusion.

Contagious pleuro-pneumonia, although occasioning great loss of stock and of milk supply, has not as yet been proven to cause any specific disease through the meat or milk. Yet the trend of present opinion (see Cameron, etc.) is to look with suspicion upon it, as well as to regard it as a threatening source of inferior meat supply. There are urgent reasons why it should be watched and studied by sanitarians, both in the interests of health and of trade. For it is to be remembered that whatever reduces the quality of meat or adds to its scarcity is at least indirectly the cause of ill health, since the poorer classes suffer physically from the higher prices, and have to feed on inferior flesh.

Splenic fever and other forms of anthracoid disease are of great interest to us, because they may be communicated by inoculation, or by the eaten meat, and also because the Texas cattle fever bears a suspicious relation thereto, so that it is called, by some good authorities, a splenic fever, or anthracoid disease.

While the most fatal and pronounced form of splenic fever is more common among foreign cattle than with us, these allied forms are to be closely studied and guarded in the interests of public health. All cattle now going from America are closely watched for Texas fever. Recently we saw some cases in the yards at Birkenhead, which were feared to be of this or some other splenic variety.

There is no contagion more dreaded than that of these anthracoid diseases.

In France the disease, as it affects sheep, is a loss, we are told by Pasteur, of twenty million of francs, or four million of dollars, annually.

Our losses by the Texas cattle disease have been large enough to lead to close inquiry, and the production or sale of such meat comes immediately under the commendation of the sanitarian.

Within the present month it has been my duty to exercise watchful oversight of a localized outbreak of anthrax. Ten cows, three horses, three sheep, one hog and several pigs have died, as if infused with a virulent poison, and post mortems have indicated the splenic character of the outbreak. The swine perished within forty-eight hours after having gotten a taste of one of the lungs, and a bull, which had broken into the pasturage, died in three days. A farmer who assisted in a post mortem, and whose hand had no abraded surface, had swelling of arm and other symptoms, which required medical care.

The swine disease, known as pneumo-entertis, swine plague or hog cholera, has prevailed in at least thirty of the States, and the losses by it have been enormous. The special report, No. 12, of the United States Department of Agriculture, 1879, refers to a tabular statement for 1877 of the losses of farm animals, chiefly from infectious and contageous diseases. The amount is stated at $16,653,428. About two-thirds of this sum was occasioned by the loss of swine by diseases presumed to be of an infectious or contageous character.

This particular disease continues to prevail in many parts of the country, and is far more common than in Great Britain or on the continent of Europe. Yet Fleming, in his *Veterinary Journal* for September, 1881, speaks of it as "an inoculable disease, due to a particular germ, which in Europe and America threatens to ultimately exterminate the porcine species."

Because it does not produce such a disease as trichinosis, its effects upon the quality of food supply must not be overlooked.

The immense losses not only effect the poorer classes by causing higher prices, which means a diminished supply of meat, but furnishes a great quantity of meat of inferior if not of diseased quality. There have been cases of sickness from pork that have not been caused by trichinæ. The new nematode found in the boy who was thought to have died of trichinæ on board the ship Cornwall (see report of Mr. Powers and Dr. Bastian, local government board, 1879), has been already alluded to.

Ballard and Klein have recently reported an acute specific disease produced by eating pork infected with a species of bacillas in two series of cases (see State Med. Sec., meeting Med. Congress, 1881), the pork being claimed to have come from America. The disease might be called a pneumo-enteritis, as both lesions were found.

Prof. Tidy, chemist of London Hospital, in some recent researches

as to poisoning from eating pork sausages, thinks he has shown an alkaloid body and some chemical changes to have caused the sickness. Meat of diseased animals putrefies more readily and shows a tendency to a septic condition which the juices of the stomach are not always able to resist.

Cases of meat poisoning that are not specific in any known sense, are multiplying.

There is a very great temptation in the case of small animals, like swine, when a disease breaks out among them, to hasten them into the potted meat can, the sausage machine, or the salt pork barrel. Any disease so extensive in its ravages and so deadly in its type, must be carefully studied by the sanitarian as a guardian of the public health.

To the disease known as trichinosis we need to turn especial attention, because of its direful results, its real existence, and the interdiction it has caused to our own great pork trade in almost every foreign country.

It is not necessary here that we sift all the historical and political facts which have to do with this trade interruption. Enough is real to justify serious attention, and enough false or accepted on insufficient evidence to astonish us that countries which have long been the recognized producers of cases of the disease should all at once have seemed to assume that trichinosed pork is an American production. Neither is there need that we fully trace the disease and its results, since this has been so often and ably done, and because the monograph by our fellow member, the lamented Surgeon W. C. W. Glazier, of the Hospital Marine Service, has so fully presented it.

We think he and others show that its occurrence here in proportion to the number of our people and our immense number of swine is not equal to that of other countries. This nematode was first discovered in Guy's Hospital, London, in 1833, and up to 1836, inclusive, nine cases had been found among hospital patients in that city: one in Bristol, England; and six in Ireland. In 1843 the trichinæ was observed in Denmark, and not long after in Germany. It is to be remembered that all these cases, as also the monograph of Luckhart and the paper of Zenker, as well as most of the observations of Virchow, antedate the record of any fatal case in the United States. The first series of American cases are those alluded to by Virchow, as having occurred in Davenport, Iowa, in 1856, in a German family. The mother returned to Germany in 1861 and died in 1864 in a German hospital.

In her breast, which had been extirpated for cancer, encapsulated trichinæ were found. Before this the disease had become well-known in Great Britain and Europe, and perchance the German woman was a host of the cyst on her first arrival here.

The report of Dr. J. L. W. Thudicum on the parasitic diseases of quadrupeds used for food, in the report of the Medical Officer of the Privy Council, 1864, covers the history up to that time. The list of Dr. Glazier of trichinosis epidemics in Europe since 1860 (pp. 82-87), and that of cases in the United States reaching to 1880 (p. 172), completes the record, and shows how great a portion of the aggregate has occurred in other countries. His list of epidemics in Europe since 1860 comprises "about 160 epidemics, with 3,044 cases, and 17 places where no number is given." Allowing, according to Meissner three cases each for places where no number is given, the whole numbers rill reach 3,095, with 231 deaths, making a total of about 150 epidemics, 3,800 cases, 281 deaths, and 700 cases and 50 deaths not in the list. See p. 87, Glazier.

A similar record as to the United States up to 1880, inclusive, gives 26 localized epidemics, with 77 cases (a few cases number not known) and 26 deaths. While neither reckoning shows absolutely the relative degree of the disease, yet it does indicate that we are to look abroad for its greatest prevalence. But, as it appears "that only one-fourth of those eating the flesh from a trichinosed hog are affected with trichinosis," and, as Pagenstecher says, "five per cent. of the cadavers in Berlin hospitals contain trichinæ," and as the disease is well proven to exist here, we cannot be too diligent in preventing it from becoming as prevalent here as it is in foreign countries. All the more because of our immense production, and of the demands of home and foreign health. The last census gives the aggregate of swine at 37,396,621, which includes only those kept by persons having land.

I am aware that large statements come to us (such as one, not long since, from Lyons, in France, and another from Boston, in the United States), which would indicate a much greater prevalence of trichinosed pork than is generally supposed.

This might occur from the observer having lighted upon a special run of the disease.

But I have also learned that the observation of microscopists, like those of clinicians, are not always correct; that their experiments, like our experience, although honest, may have sources of error, and

that the cautions given by Surgeon Sternberg, on page five of his excellent preface to his "Translation of Magnin's Brochure on the Bacteria," are to be observed as closely as what is seen under the microscope.

The French decrees of February last, the action of the English government, and that of some States on the continent, led our own government to an investigation which needs to be more exact and extended, but which, nevertheless, shows that the prohibition of importation was not well advised.

While there is still a kind of restrictive legislation which is unwise, yet we believe there is more of a disposition to get at the precise facts in a more authentic way, and to regulate commerce on the basis thereof. In this connection I submit a brief extract from a debate in the House of Lords, on May 16, of the present year, a summary in the New York *Times* of September 14, 1881, based on the testimony of Consul Mason, of Basle, to our government, and a communication from Dr. Lyman, Veterinarian of the United States Department of Agriculture, of date October 29, 1881, in answer to certain questions I had asked.

(*a*). In the House of Lords, May 16, of the present year, Lord Stanley, of Alderly, asked Her Majesty's Government whether they would prohibit the importations (alluding to pork), of which a large proportion were infected with trichinæ and bacilli; also of such oleomargarine or butterine as contained the grease of pigs suffering from the new disease of swine at Chicago, and the fat of horses infected with disease or such as was adulterated with soapstone. The Marquis of Huntley said he could assure the noble Lord that there was no established case of American hams being infected with trichinæ, and there had been one case only of infection by bacilli. (See Fleming *Vet. Journal*, June, 1881, p. 462).

Consul Mason writes from Basle that abundant and unmistakable evidence shows that the panic about American meats has begun to decline. From the first it was artificially created, mainly by such official action as the French decree in February prohibiting importation of American pork, and a published document from the Minister of the Interior in Neufchatel asserting that the microscope had shown more than half of American hams and canned meats to be infected. That Canton takes most of its 150,000,000f. of exports from this country in the form of meats, and the trade has been almost destroyed for the present, although no case of trichinosis has ever been

reported there. But as consumers, who have taken no part in the scare, have found themselves suffering from advanced prices, they have begun to complain, and as the sales of domestic meats in the difficulty of discriminating have been affected, dealers who thought they saw "protection" in the scare have joined the demand for removal of the prohibition. The leading meat importer in Basle has for several years subjected all his meats, from whatever country, to microscopic examination by the official city inspector; the occasional pieces containing traces of defunct trichinæ were saved, and were experimentally fed to hogs, chickens, cats and dogs, but at the end of six months no trace of disease could be found in the flesh of these animals. The "syndicate of lard and salted meats" of Bordeaux made an elaborate protest against the French decree, saying that in twenty-five years only a single case of the disease has occurred in France, and the character of that was disputed; that Germany has excluded only chopped meat for sausages; that there is no prohibition in Europe except in Italy and perhaps in Spain; that no decrees can keep out American meats, although disguise may be forced; and that it is supreme folly to injure the people of France for the sake of an imaginary danger. The Swiss *Journal de Geneve* remarks that the Ministers in Paris, London and Brussels have been compelled to acknowledge that not a case of trichinosis from use of American meats has ever been authoritatively shown to have occurred in Belgium, France or England, and it ascribes the scare to the jealousy of European meat growers and the desire of speculators in America to break the pork market, saying that a single Chicago firm is reported to have cleared 30,000,000 francs in one year by a skillful combination. Mr. Mason thinks the foreign trade in salted meats can never be fully restored without establishing in this country a system of official inspection which shall carry with it the weight of State or Federal authority. German municipal experience, notably in Berlin, has shown that a capable inspector can examine several hundred pieces per day, and he thinks young men of ordinary education and good eyesight could be trained in a fortnight, by a competent microscopist, to do this work, and that the cost need not exceed three cents per hog. Until this or some equivalent step is taken, the one per cent. of diseased hogs admitted to exist here will be a serious obstacle to the export trade in meats, for European meats are officially inspected, and to be able to say that American are not, is to give opponents of our trade the power

to keep up a prejudice. An official report in review of the whole subject is needed, showing by statistics the extent of the hog product in this country, the immunity of our people from disease, how many hogs die of cholera and transportation accidents and what becomes of them, and the actual values of land and corn in the pork-growing States. It is often published, and is more or less believed, that the comparative cheapness of our meats abroad is because the bad or questionable qualities are exported. This can be combated by showing that the cost of growing the best quality here permits exporting it at the prices it bears abroad. Such a report should be published under an official seal, which is, of all things, the most authoratative with a European, and should be distributed abroad.

DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., October 29th, 1881.

E. M. Hunt, M.D., Secretary, etc., State Board of Health, Trenton, N. J.:

MY DEAR DOCTOR—Your letter of inquiry of the 22d inst. is duly received. I will answer your questions as fully as I am able to do so. You ask:

1. State the comparative number of cases of trichinæ that have been identified as to their origin, viz.: how many American, English, French, Continental?

If this refers, as I suppose it does, to disease in humans, I am unable to answer.

2. How many live hogs are claimed to have come from America with trichinæ?

From the annual report of the English Veterinary Department for 1879 I copy the following:

"The slaughter of large numbers of American swine at the port of landing afforded opportunity of obtaining specimens of flesh for examination, with the view to ascertain what proportion of the animals were infected with trichinæ. The inspectors of the Veterinary Department examined two hundred and seventy-nine separate portions of swine's flesh which were sent from Liverpool, and detected living trichinæ in three specimens. * * * No doubt, therefore, existed as to the dangerous character of American pork, and a consultation on the subject took place with the medical officers of the Local Government Board; the matter was also discussed in the House of Commons; but it was not deemed expedient to prohibit

the introduction of American pork into this country, for the reason that such a measure would have damaged the trade without producing any satisfactory results, * * * besides which trichinosis among swine is known to exist in Germany, and it probably exists in other exporting countries, so that nothing short of total prohibition of swine flesh in all forms from all sources would have been effectual. The possibility of our own swine being to some extent infected with trichinæ has been suggested; the result, however, of many examinations has, up to this time, been negative."

I do not know that Germany or France has even examined for this disease in *live* hogs.

3. How much shipped pork has been identified with it?

To foreign countries, Germany reports each year some, if I remember rightly, three to four thousand "pieces" of American *pork*. Where they get them, what a piece is, or what percentage of pieces examined and found diseased, I have never seen any statement of their saying. I do not know that they have made any publicly, neither do I know that other foreign countries have done any more than to say that they found, upon examination, that trichinæ existed in American pork, as they had seen it arriving in their countries.

4. Have Western hogs in any one section been more affected?

It has no such favorite locality that we know of, although this will be a good ground for future investigation.

5. Are trichinæ found in the fat, as in cold tried lard? I have until now thought not. Professor Taylor, of this department (microscopist), tells me that in the Journal of the Microscopical Association he has recently seen that they have been found in fat. I should rather see than believe without so doing. A veterinarian, of New England, informed me, on April 14th last, that he had examined portions from 2,701 Western hogs, obtained in Boston, 154 of which he found infected—i. e., one case to each 17 54-100 hogs examined. He tells me that he will make a statement to this Savannah meeting that he has examined portions of 8,773 Western animals, and has found one case to every twenty-five animals. You will see that there is a great difference between his first (April) examination and this one, and his result is so greatly different from the English examination of our hogs, above mentioned, and so much above any known percentage among animals of every other country, that I cannot but entertain doubts of the value of his examination.

* * * * * * * * *

While such facts are to be borne in mind, the gravity of the disease, its cosmopolitan character and the interest both of health, life and trade, require that, under the lead and authority of the United States Government, there should be such testing of facts as will be fully reliable, and not depend on single observers, and that some plan may be devised to secure both to animals and mankind immunity from this direful invasion.

The latest and most graphic outline of the disease is given incidentally in a scientific address by the veteran naturalist, Richard Owen, who gave it the name trichinæ. It is worthy of transcription: "The finding of the wormlet within the cysticule in 1835 (proceedings of the Zoological Society of London, February 24, 1835.; also Transactions, ibid. 4 to vol. 1), and the more important discovery of Dr. Zenker, of Dresden, in 1860, of its causative relations to a direful disease, have demonstrated that the several groups of symptoms to which I have referred under the respective technical denominations applied to their groups, may, one and all, be due to the deglutition of trichinæ spiralis."

It is thus all the more serious because the symptoms stimulate so many diseases, such as dyspepsia, common diarrhœa, dysentery, peritonitis, pneumonia, rheumatism, gout, typhoid fever and endocarditis. The larvæ of this wormlet in the flesh of the animal it infested, being introduced as food into the human stomach, finds in that warm cavity an environment of muco-chymous nutriment, in which it rapidly matures, acquires activities and develops its generative organs and products. If permitted to pass into the intestinal canal, it there excludes its progeny, which also rapidly acquire their full size and procreative faculty. But the grave symptoms of their presence are due to the curious migratory instincts of the young trichinæ, which impels them to make their escape by perforating the tunic of the intestines, in the course of which operation the majority find their way into the venous capillaries. Such as wriggle through the meshes of the vascular network, bore their way through the serous tunic of the gut and pass into the abdominal cavity, whereupon the peritonitic are complicated with the enteritic symptoms. But the majority are carried to the right side of the heart, and thence by the pulmonary artery to the lungs. Treading then the capillaries continuous with the commencement of the pulmonary veins, the trichinæ are brought back to the heart. As many as may have burrowed into the vascular walls of the right or the left ventricle, or

may have got into the cavity of the pericardium, give rise to the symptoms summed up in the terms of art already cited.

Trichinæ, which may have strayed into the tissue of the lungs, or which may have wriggled through the pulmonic serous covering, and from the pleural cavity may have invaded the serous membrane on their way to the intercostal muscles, add the pleuritic and pulmonic to the pericarditic symptoms. The natural affinity or attraction of the trichinæ is to myonine or the muscular tissue. There their wanderings come to an end. They are conveyed so soon and so rapidly by branches of the carotids to the muscles of the larynx, that the trichinæ are there found most constantly and abundantly, but usually so vast is their number that they are carried to the voluntary muscles of the entire body. In the exceedingly delicate connective tissue of the ultimate bundles of the ultimate fibrils, the young trichinæ coil themselves up to their larval repose, exciting no other organic change than an overflow of plasma, which condenses with the contiguous cellulosity and becomes moulded into the shape of an elliptic case, in which may be seen under the microscopic compressorium one or more of the tiny worms disposed in two or more circular coils.

An ounce of hog's muscle has been found to contain 85,000 trichinæ, while Thudicum estimated 40,000,000 in the body of a German who died in the London Hospital, and Cobbold, who reviewed the calculation, thought this below the number. He calculated in the flesh of a hog, that had caused an epidemic in England, 80,000,000.

Thus far the record of cases in Germany and of endemics thereof has been ahead of that of any other country.

The number of cases recorded by Glazier for the United States, from 1864 to 1880, is seventy-eight, while post mortems have afforded proof of their existence many times.

We believe there is nothing to point to this disease as more prevalent in the United States than in other countries. Yet it is prevalent enough, and its occurrence possible and serious enough to demand the closest attention of all those whose effort it is to prevent disease.

The immense swine production and pork traffic of this country, of course, makes the aggregate number of cases larger, and, at the same time, enforces the interest and the duty of leaving no measures that are expedient untried to limit or destroy the disease. Not because it is an American parasite, for Heller (Zemssan Enc. III., p. 628) says that trichinæ have been found in all countries where search has been

made for them, and Pagenstecher says: "They are cosmopolitan with man, hogs, rats and mice."

As it is not like a disease spread through the air and does not rapidly pass from one animal to another, save where there is a source of production, there are great encouragements for an attempt to eradicate the disease. There is some reason to believe that rats frequenting hog pens are often its conveyancers, and that we need some "Pied Piper of Hamelin" to drive them all into the sea. Cobbold says infection must be due to the facilities for swallowing garbage, especially dead rats. It is an established fact of natural history that hogs are not by nature filthy in their habits or in their choice of food. If mankind thrust upon them all sorts of improper food, all the indignation must not be projected against the brute. A treatise on the hygienic management of swine is in order, especially as they have become subjected to such invasions.

All serious diseases which are either directly transmissable to man, or which by the diseased or imperfect meat and milk they put on the market, or by the actual loss of food supply they occasion, must attract the attention of all sanitarians.

And as our foreign trade is being so much affected, both in the interests of health and of commerce, we should join in consultation and advice with those who have to guard our commercial and national interests.

We may call it prejudice or retaliation, and to some extent correct the distorted views of some of our British and continental friends, but so long as there is a basis of truth it behooves us, both in our home and foreign interests, to do all that is intelligent and practicable in stamping out or limiting these diseases.

For this we have a few suggestions to make:

I. There is need of accurate study into causes as well as into methods of limitation. Our government has done some good work in the way of investigation, and the present distinguished head of the Agricultural Department, Dr. Loring, is by profession, agricultural knowledge and executive experience, well fitted to do more.

There are some veterinarians that are at work, but the number of these is small, and it is difficult to find enough others who are capable.

We feel that medical men and others of this association should feel these investigations to be as worthy of their labor as those directed to some human diseases. The time has come when medical and sanitary experts should recognize the study of the comparative plagues as a part of their work and devote the closest study thereto.

II. Some form of direct oversight should be exercised in every State over the communicable disease of animals. There is no more economical outlay than that which guards our milk and meat supply. An authority in every State to oversee the work and to circulate information among farmers and stock raisers, to obtain knowledge through local township committees, supervisors or health boards of special outbreaks and to secure from assessors exact statements each year of all deaths and known causes of deaths of animals would be of essential service. Thus infected districts would soon be singled out and the diseases ere long eradicated. In Germany microscopical examination of pork has been made compulsory.

III. Public abattoirs and inspection thereat should be encouraged.

IV. All live stock sent out of the country should be inspected at the point of final shipment by a government veterinary inspector.

V. Pork packing and smoking establishments should guarantee their methods, and be subject to penalty if the meats furnished by them are proven to have caused disease. Trade marks and brands are easily made, and severe penalties to producers for any meat that is proved to have caused sickness is one of the best precautions. It will then be the interest of large establishments to protect themselves by sampling lots with the microscope and by other expert examinations.

VI. A system of inspection is desirable; but we do not wholly rely upon it, as being exceedingly expensive, and as not alone accomplishing as much as when enjoined with other methods.

VII. All wholesale lots of chopped meats or sausage or of potted meats should be certified by competent meat inspectors.

VIII. It should be known that thorough salting and cooking remove all risks from animal parasites. Virchow, in treating of this disease, expresses his regret that the old forms of curing and smoking have had so many substitutes.

IX. Careful inquiries thould be made as to the presence of parasites in fats, and as to the fats of diseased meats, lest lard and oleomargarine, et cetera, may be so prepared as not to be subjected to proper heat, and our risks be increased in this direction.

In view, therefore, of the vast interests involved to health, not less than to commerce, we trust this association will direct still more careful attention to the communicable diseases of animals, and seek to find their causes, and arrest their courses, since, be it man or beast, it is a common concern in a common welfare.

We append tne approximate summary of the last census of all live stock in the States and Territories, as found on farms or with those owning land. The aggregate shows a yearly product of one hundred million, if we estimate all, used as food:

FOOD STOCK IN THE UNITED STATES.

STATES AND TERRITORIES.	Working Oxen.	Milch Cows.	Other Cattle.	Sheep.	Swine.
Alabama	75,534	271,443	404,218	521,267	1,252,462
Arizona.	984	9.156	34,843	112,107	3,819
Arkansas	25,444	249,407	433,392	375,795	1,565,098
California	2,288	210,078	451,941	5,644,341	603,339
Colorado	8,179	28,770	315,989	994,844	7,656
Connecticut . . .	28,399	116,198	92,121	104,592	63,662
Dakota.	11,418	40,572	88,825	47,116	63,394
Delaware	5,818	27,284	20,450	40,044	48,186
District of Columbia	4	1,292	271	. . . . .	1, 32
Florida.	16.141	30,359	414,869	80,169	287,051
Georgia.	50.026	315.073	544.812	752,490	1,471,003
Idaho	737	12,838	71,292	39,246	14,178
Illinois	3,346	865,913	1,515,093	1,544,728	5,170,168
Indiana.	3,970	504,944	865,136	1,614,073	3,186,413
Iowa.	2,504	854,097	1,754,341	669,510	6,034,316
Kansas	16,789	418,333	1.015,935	733,275	1,787.969
Kentucky	36,076	301,882	494,743	1,678,515	2,225,225
Louisiana	41,729	146,454	282,418	203,177	633,489
Maine.	43,049	150,845	140,527	944,856	74,269
Maryland	22.246	122,907	117.387	306,960	335,408
Massachusetts. . .	14,571	150,505	96,045	109,796	80,123
Michigan	39,493	384,573	467,060	3,065,533	964,071
Missouri.	9,020	661,405	1,410,487	2,193,006	4,573,123
Montana	936	11,308	160,143	211,225	10,278
Nebraska	7,234	161,609	613,129	285,935	1,241,724
Nevada.	765	13,319	158,137	193,894	9,080
New Jersey . . .	2,022	152,078	69,786	237,368	219,069
New York. . . .	39,633	1,437,855	852,283	2,718,093	751,916
North Carolina . .	50,188	232,133	375,105	690,894	1,453,541
Tennessee	27,337	303,832	444,736	1,079,743	2,158,169
Virginia.	54,709	243,061	388,414	823,776	956,451
Wisconsin	28,762	478,374	622,005	1,921,047	1,128,239
	671,351	8,897,917	14,811,928	30,027.415	37,369,621

Recapitulation.

Oxen	671,351
Milch Cows	8,897,917
Other Cattle	14,811,928
Sheep	30,027,415
Swine	37,396,621
	91,805,232

ART. III.—EPIZOOTIC SUPPURATIVE CELLULITIS; OR, PHLEGMONOUS ERYSIPELAS IN HORSES.*

BY GEORGE H. BERNS, D.V.S.

While a great deal has been published in the daily papers, agricultural and medical journals on the subject of epizootic cellulitis, catarrhal influenza, or pink-eye, as the late epizootic disease among our horses is popularly termed, nothing has been said upon *Suppurative Cellulitis*, which, in my opinion, is more important, more difficult to treat, and far more dangerous than the ordinary pink-eye.

It consists of an acute inflammation of the subcutaneous cellular connective tissues, which terminates in suppuration and destruction not only of the connective tissues involved, but generally in devitalization of the skin that covers the affected parts, and in some instances the sheaths of tendons, coats of blood-vessels, nerves and synovial membranes become affected, and cause a fatal termination from open joints, blood-poisoning, sympathetic fever, or general prostration. I venture to say that at least fifty per cent. of all the horses in Brooklyn have suffered to a greater or less extent from the ordinary non-suppurative form of cellulitis during the last two or three months, and it is a well-known fact, that the disease ran its regular course, and in very nearly all uncomplicated cases, terminates in restoration to perfect health in from five to fifteen days.

Last fall and winter, immediately after the epizooty, and again this fall a large number of horses are suffering from a very unmanageable form of inflammation of the skin, a subcutatious areolar tissue of the pastern and fetlocks, which in aggravated cases extending all the way up the limb to the thigh, or elbows. This inflammation appears to originate in the cellular connective tissue, and terminates in suppuration and the formation of large abscesses, constituting what is known as *Suppurative Cellulitis*.

Last season this disease was considered by many to be a malignant form of *Erythema*, *Mud Fever*, or *Scratches*, due to the filthy condition of the streets, and improper attention to the

*Abstract of a clinical lecture recently delivered at Columbia Veterinary College.

horses feet and legs on the part of their attendants; others believed it to be *frost bite* of the heels and pasterns, and blamed the railroad companies for throwing salt on their tracks. That these views are erroneous, is evident from the fact that the same disease prevails this season, which has been remarkably dry and mild.

I believe this local form of cellulitis to be due to the same obscure and unknown causes which produced the late epizooty, and at this time I will not venture into any speculative theories as to the probable causes of that disorder, for nothing is positively known upon the subject.

Symptoms.—We are called upon to see a lame horse, and are generally informed by the owner or attendant that most all the horses in the stable suffered from pink-eye; but the one now lame escaped, or had a very mild attack.

Examination of such patients reveals the following:

The horse is lame to a greater or less extent in one limb. There is tenderness on pressure, increased heat, and redness of the skin (if the leg be white in color) in the region of the pastern and fetlock. The lameness increases in severity, and, at the expiration of two or three days, a serous discharge, somewhat yellowish in color, exudes through the skin and coagulates upon the hair which covers the parts.

About the fourth or fifth day, manipulation of the tender and swollen parts reveals fluctuations and a collection of fluid under the skin, resembling a large abscess. If cut into, or allowed to rupture without any surgical interference, a quantity of a redish-colored fluid escapes, mixed with shreds of devitalized areolar tissue.

If the wound is then explored, a large cavity will be found: the skin separated from the structures underneath to the extent of several inches. The skin itself, immediately over the part, seems to be dead, sinks on pressure, and presents a doughy feeling. Two or three days later a line of demarcation makes its appearance, separating the gangrenous from the living structures. The devitalized portion of the skin will slough out, leaving a wound several inches in diameter, with an irregular, granulating surface, which requires considable time to heal. In more aggravated cases the swelling and tenderness extend all the way up the limb, collections form in the cellular connective tissues, burrowing in between the deep-seated blood-vessels, nerves, ligaments and tendons, even through synovial capsules, into the cavities of joints.

In mild cases there is but little systemic disturbance, but in severe cases the constitutional effects are so severe as to destroy the animal's life. I have one case under my care at present, in which collections formed from the coronæ all the way up to the thigh, and there are at present nine openings in the leg, most of which communicate with each other, and all discharge large quantities of thin brownish-colored fluid, mixed with pus and shreds of connective tissue. The skin around these openings, to the extent of several inches, presents a sodden, doughy sensation to the touch, and to judge from present indications, the skin will probably slough from the larger portion of the leg.

The subject is a young horse, previous to present attack in good health, and escaped when most all the horses in the same stables suffered from pink-eye some three or four weeks ago. This horse is the property of Mr. Nugent, of Congress St., Brooklyn.

I saw him a few days after he showed the first signs of lameness, and an examination revealed considerable constitutional disturbance. Pulse increased in frequency, temperature elevated, loss of appetite, with redness and tenderness on pressure in the region of the pastern.

A cathartic was administered and a flaxseed poultice ordered to the inflamed pastern.

Second day.—General condition of patient about the same; lameness worse.

Third day.—Bowels acting freely; patient refuses all food; general condition about the same; the skin of the pastern had ruptured, and a copious discharge issued from the opening; the wound was cleansed with an antiseptic solution, the ragged edges removed, and ground flaxseed mixed with a strong solution of carbolic acid applied to the part.

Fourth Day.—Horse shows signs of extreme agony, held the affected limb up from the floor, sweat covered his body, pulse soft and very much increased in frequency—temperature 106. The leg is considerably swollen all the way up to the hock, and very sensitive to the touch. When poultice was removed from pastern, a large section of devitalized skin adhered to it, leaving an unhealthy granular surface beneath. Anodynes and sedatives were employed internally, the wounds dressed with antiseptics, and the upper part of the leg bathed with lead and opium wash.

Fifth Day.—Animal continued in great distress, lifting the affected

limb constantly, breathing hurriedly, and the perspiration dropping off of him. Opium was given in full doses with aconite, wounds dressed with antiseptics, lead wash continued.

Sixth Day.—Distinct fluctuations could be detected in front of the fetlock; an opening was made which discharged freely; a cloth, saturated in a lead and opium solution, was applied to the metatarsal region, and kept wet constantly with the solution. The tincture of the chloride of iron was given in liberal doses.

This morning, on removing the cloth, seven or eight openings around the metatarsal bone, and one on the inner surface of the thigh, were exposed to view. All of them had ragged, dark-colored edges, and all discharged profusely. The animal was very much easier, but the general symptoms remain about the same. Temperature, 105; respiration, 80; pulse, 110.

At our next lecture, we will continue this subject; and I hope to be able to make a more favorable report upon this particular case, although his condition is at present extremely critical, I consider that there is still a chance for recovery.

ART. IV.—EXPANSION AND CONTRACTION OF THE FOOT, AND HOW TO SHOE IT.

(*Continued.*)

In my effort to revolutionize the old-time method of shoeing horses, which has been no more or no less than a necessary evil, by nailing down the elastic foot to an inelastic piece of iron called a shoe, I shall address the general public in the plainest language at my command, using as few technicalities as possible.

Had I the veterinary faculty alone to address, my task would be an easy and pleasant one, for that class, as a general rule, is free from prejudice, and competent to comprehend my entire theory. It is, however, quite different in addressing the general public, those who are the chief owners of a majority of the horses of the country, and

w o, as a class, are intelligent enough upon all subjects regarding the horse except his diseases, his anatomy and physiology, and especially are they ignorant of the structure of the foot, and how to shoe it,—an art to which they have paid no attention, and cared as little, whenever a blacksmith could be procured, who could fasten a shoe to stay on six or seven weeks, or until the shoe is carried forward by the natural growth of the foot, and its heels rest upon the sole, or bars inside the wall; this, with the cramping of the foot by the shoe, could scarcely fail of evil results. Under such circumstances, I am not unmindful of the amount of ignorance and prejudice I have to encounter, and the utter impossibility of changing old practices, and removing old prejudices, until the owners of horses are made familiar with the anatomy and physiology of the foot.

With such knowledge, the otherwise intelligent owners of horses will readily become convinced of facts which otherwise would remain wrapped in prejudice in the future as in the past. Indeed, the intelligent farmer, and other owners of horses, are not the classes who offer the greatest resistance to science and progress; but a class of men quacks, who also uneducated, possess an unbounded amount of audacity and impudence, and try to show their own fancied skill by antagonizing every theory which differs from their own shallow ideas.

One assurance I have, however, is that every high-minded, educated veterinarian stands ready to measure my theory with the unerring law of nature, and facts previously known to the profession. This is all I desire or expect; therefore, I shall endeavor to define the anatomy and physiology of the different organs composing the foot, how its expansion and contraction is effected before being shod and after, and how it should be shod, to permit its natural expansion and contraction as fully as when shod as before.

ANATOMY AND PHYSIOLOGY OF THE FOOT.

Externally, the foot is composed of a wall (hoof), a sole, a frog, two bars, and a frog-band, all of which are insensible or destitute of feeling, and are produced by the sensible internal organs out of the blood they contain. Internally, it is composed of a sensible sole, and a sensible frog, a sensible corronary substance, a patella (or coffin-bone), a navecular (or shuttle-bone), two lateral and two inferior cartilages. The perforous tendon, though not considered a part of the foot, enters at the heel, and deserves a passing notice. This is the

main tendon of the limb, and is inserted into the inferior surface of the coffin-bone. There are also about five hundred narrow, thin, leaf-like sensible strips attached to the coffin-bone called laminæ, which are dovetailed into a like number of insensible laminæ attached to the internal surface of the wall. By this wonderful dovetailed attachment, the entire weight of the horse is attached to the internal surface of the wall; so that, while standing at rest, but little if any of his weight rests upon the sensible parts of the foot.

Viewing the foot in a standing position, the wall and frog-band are the only organs visible; when the foot is taken up in the act of shoeing, however, the insensible sole, the insensible frog, the bars, and the inferior border of the wall are seen. The above organs, therefore, constitute both the external insensible and the internal sensible organs composing the foot.

In demonstrating the anatomy and physiology of the organs separately, I shall not confound the reader by going into a minute detail or scientific analysis of the parts composing each organ, except so far as it is necessary in proving the cruelty of the present way of shoeing, and the humane results of the new method.

The insensible frog is a letter V, or wedge-shaped mass of horny, fibrous substance situated in the inferior posterior portion of the foot; it is partially divided upon its outer surface by a fissure called its cleft, but not to its apex or its base. Both sides of the fissure are called its bulbs, which never come in contact with the wall, except at their extreme posterior termination. It divides the sole in its center, having an equal portion on each side of it Perhaps it might be said that the sole is divided for the reception of the frog, to enable both in conjunction to sustain the weight thrown upon them in violent action. It is firmly attached to the sole on each side where it divides it, leaving a space on each side which is occupied by the bars between it and the wall. In a healthy state, the horny frog is elastic to a high degree; so much so, indeed, that, when violently pressed, it bends under the weight, its bulbs expand, almost reaching the wall, obliterating its cleft, but as soon as relieved of the pressure, bounds back into its natural shape. I have made many experiments with artificial pressure, and never could force it against the wall.

The extensive uses nature demands from the frog are: To defend the sensitive frog above it from injury, and to support the weight thrown upon it. It had been erroneously considered that the latter duty had been performed by its contact with the ground; but

this opinion will not hold good when we consider that it performs equally well when elevated from the ground by thick, or calked, heeled shoes; in such cases, its junction with the sole supports it equally as well.

The insensible sole is placed in the anterior, inferior portion of the foot, and, like the horny frog, is horny, fibrous and elastic, but not as elastic as the frog. It is an arch of greater or less concavity, and is found to differ much in concavity in horses of the same breed, but is much more marked as between fine-bred horses and those of coarser breeds. Its base, or margin, is firmly attached to the inferior margin of the wall all round, a little above its contact with the ground.* This greatly increases its concavity, and will be alluded to further on. It is also firmly attached to the frog on each side, where that organ divides it.

The bars are an inflection or turning in of the extreme posterior ends of the wall upon the sole, in the space between the wall and frog, forming something of a V-shaped eminence upon the sole. Its apex, however, is interrupted by that of the frog, the bars not reaching as far forward as the apex of the frog. The object of nature, in this regard, appears to be two-fold—first, to strengthen the sole where it is divided by the frog; secondly, to perform the office of stays or braces, to resist contraction of the wall upon the internal sensible parts it envelops.

The sensible sole is a tough, elastic, fibrous, vascular substance and highly sensible. It is placed above the insensible sole and beneath the coffin bone, to whose laminated edges it is attached all round its inferior border, and serves as an elastic cushion between it and the insensitive sole beneath it, thereby obviating concussion in the unshod foot, but in the foot deprived of expansion is liable to concussion at any time. Its superior surface is composed of a ligamentous, tendinous structure, and its inferior surface presents a cuticular structure liberally supplied with a network of blood-vessels, many of which penetrate the insensible sole, and may be readily seen bleeding in cutting down an injured or diseased sole, and if cut entirely away, a new sole will be furnished by the network of blood-vessels above mentioned.

The sensible frog is also a tough, elastic mass, partly ligamentous and partly tendinous and fibrous. It is liberally supplied with nerves and blood-vessels, the latter forming a network. It is situated above the insensible frog, in the posterior part of the foot, occu-

pying the entire space above the insensible frog, to which it fits exactly, and reaches to the cartilages on each side. The perforans, or flexor tendon, alluded to before, passes over it and beneath the navicular bone on its way to its insertion into the inferior surface of the coffin bone. It is thicker than the sensible sole, and irregular in shape. Its uses will be explained further on in the proper place. Doubtless the reader will readily perceive that the sensible sole and frog compose an elastic cushion, or pad, for the reception of the coffin and navicular bones in their descent, when great weights are carried, or the foot is put down heavily in violent action, thus obviating concussion between them and the horny sole and frog beneath them.

The coffin and navicular bones.—The pedal, or coffin bone, is the lower bone of the limb. It is composed of a body and two wings, the body anteriorly and the wings posteriorly within the wall, to which it is attached all round, its anterior and latteral surfaces by the laminæ heretofore spoken of. Its inferior concave surface rests slightly upon the superior convex surface of the sensible sole while standing still. but heavily in violent action. As before remarked, the sole is attached to its inferior border all round. Its wings reach backward from its body, and the navicular bone is placed between them and above the sensible frog. The inferior surface of the navicular is quite smooth, and acts as a pulley to the perforous tendon as it passes beneath it and above the sensible frog on its way to its attachment into the inferior surface of the coffin bone, as before alluded to.

Both the coffin and navicular bones are fitted upon their superior surfaces for the reception of the coronary or inferior pastern bone. The coffin bone is supposed to bear two-thirds and the navicular bone one-third of the weight thrown upon the limb, and the junction of the three bones constitutes the coffin joint.

The reader, therefore, will readily understand that the tendon passes beneath the navicular bone and above the sensible frog, so that the tendon bears the navicular and one-third the weight of the limb supported by the sensible frog, and it by the insensible frog. Therefore it is not difficult to comprehend nature's object in placing two such elastic organs in support of the main tendon, and the foolishness of those who claim that the frog is placed there as a wedge to expand the wall.

Suppose, for one moment, some wedge-shaped substance placed

between the heels of sufficient density to force the wall apart. The effect upon the sensible parts above it would be, of course, concussion, inflammation and destruction.

The lateral cartilages deserve no more than a passing notice, having but little to do with the expansion and contraction of the foot. They, however, are susceptible of great injury from contraction of the wall upon them and other causes. They are situated upon the superior margin of the wings of the coffin bone, and have much to do in the suspension of the limb. The laminæ alluded to upon the coffin bone reach back upon their outer surface. They are, therefore, united to the wall, and assist the coffin bone in its support. Rising above the wings of the coffin bone, to which they are firmly attached, they fill the space above the wings, which without them would be a hollow, empty space. The part they take in the attachment of the coffin bone to the wall, and preventing a latteral or rocking motion of the internal parts, seem to be their chief uses. By their elasticity they readily yield to sudden contraction and expansion of the wall.

The inferior cartilages are more elastic than the lateral. Being of fibrous construction, their principal use is to fill up the space between the perforous tendon and the wings of the coffin bone.

The sensible laminæ are narrow strips or plates attached to the coffin bone, and latteral cartilages upon their external surfaces from their superior to their inferior margins. They are fibrous in structure, highly sensible and elastic, plentifully supplied with nerves and blood-vessels, and much resemble the pinching up of a lady's frill. They are about five hundred in number. I shall fully describe them in their proper place.

The insensible laminæ are equal in number with the sensitive laminæ. Their structure is horny. They are insensible, having neither nerves nor blood vessels, and closely resemble the little leaves upon the inner surface of a mushroom. They and the sensible laminæ are dovetailed into each other, by which union the coffin bone is so firmly attached to the internal surface of the wall that no action of the horse under reasonable circumstances is able to sever them. As before remarked, by this dovetailed union the entire weight of the horse is sustained. An idea of the strength of their union may be gained by seeing a horse jump over a wall five to six feet high, carrying on his back a man weighing one hundred and sixty pounds or over.

The coronary substance, commonly called secreting substance, is placed above the coffin bone and within the superior surface of the wall, which it secretes and supplies as fast as worn down or cut away by the smith. About its structure and its functions, however, there exists a great difference of opinion among eminent writers. Some contend that it is a continuation of the inner and middle layers of the skin, while others contend that it is an exclusive organ secreted by the skin and differing from it in structure, but that the skin furnishes it with nerves and blood vessels, and that only a portion of the wall is secreted by it, and that the other portion and the insensible laminæ are secreted by the sensible laminæ. This I deny, and expect to prove further on.

The coffin bone, as before remarked, is situated in the anterior cavity of the foot within the wall. It is the last or lower bone of the limb. It is concave on its inferior surface, exactly corresponding with the convex or arched surface of the sole, and on its lateral and anterior surfaces exactly corresponds to the concave form of the wall to which it adheres closely. It is an exceedingly light bone; its exterior surface is quite rough and ariolar, for the attachment of its periostial membrane, much resembling the attachment of the capsular ligaments to jonts; but, unlike the bones of joints, it is furnished with little grooves in which nerves, absorbants and blood vessels repose and are protected. Its body is internally traversed with holes or passages, through which blood vessels and nerves pass on their way to their destination. Thus it will be seen that they are protected, as by an arch, from the injury they would otherwise sustain by passing beneath the bone. As before remarked, the perforous tendon is inserted into its inferior surface.

It is covered with a double, tough membrane, similar to the periosteum of other bones of the body; but that upon the coffin bone differs from the other in so far as that the covering of the coffin bone is double, composed of two layers of membrane, the inner layer closely attached to the bone, and the outer, which is much the widest, is thrown into folds or plaits, and receive the nerve laminæ. Those are the sensible laminæ before mentioned. Mr. Brunal says that the supposed elasticity attributed to the plaits is derived from the substance which connects the two layers together, and furnishes a bed for the blood vessels and nerves which proceed through the ariolar structure of the bone.

The entire periostial covering of the bone composing both the

layers and laminæ appear to be produced by the coronary substance, for the outer layer, which pinches up into folds forming the sensitive laminæ, seems to be a continuation of the cuticular covering of the coronary substance, which is much greater in circumference than the coffin bone is. This, to a great extent, accounts for its being thrown into folds.

The wall, or hoof, is the horny covering designed by nature for a protection to the internal sensitive parts it envelops, and so completely is it organized and shaped, that not only does it defend the internal organs of locomotion, but also the coronary substance which produces it within its superior border, and with its inferior border defends the outer insensible sole to a certain extent from injury, by reaching below it and first coming in contact with the ground, the better enabling it to support the entire weight of the animal. Its border suffers much wear and tear, hence the necessity for shoeing. The wall gradually decreases in height to the heel, and if continued in a direct line backward, would end in two sharp points, but instead they become inflected downward, inward and forward upon the sole, and are those before spoken of as the bars.

Form and formation of the wall.—Its superior border, commonly called its coronary border, is scooped, or beveled out upon its internal superior surface, to about three-fourths of an inch around its entire circumference. It rapidly becomes thinner toward its superior margin, until its extreme edge becomes acute. This is named its coronary concavity (coronary ring). Within this concavity reposes the coronary substance which secretes the wall. Some contend that only a portion of the wall is secreted by it, which I deny. Upon the coronary substance may be seen with the natural eye an indefinite number of villi, or small projections, resembling papillæ; and upon the beveled surface of the wall a like number of perforations or depressions, which receive each one of the villa of the coronary substance. These perforations are the superior or upper ends of so many cylindrical little hollow tubes, which reach to the inferior margin of the wall, and are the basis of its structure.

If nature had not provided means for the connecting or gluing of these little tubes together, the horse would be seen standing upon thousands of little stilts, which would, more than anything else, remind one of a brush with the hairs toward the ground. Each villus is seen to dip into one of those little tubes, which they secrete and sup-

ply as fast as they are worn down or cut off at its ground surface Nature, however, comes to the rescue, and furnishes a cementing substance which binds them together and obliterates the spaces between the tubes, making it a solid wall as we see it. The substance which connects the tubular structure is called its cementing matrix, and about its secretion there has arisen a perfect Babel of different opinions. One gentleman pretends to prove, with seeming force, that the connecting matrix and insensible laminæ upon the internal surface of the wall are secreted by the sensible laminæ upon the coffin-bone which is dovetailed into them. Another gentleman says that the matrix is secreted by the coronary substance which secretes the little tubes also, but that the sensible laminæ secrete the insensible laminæ. Two other eminent writers say that the tubular structure—the connecting matrix and insensitive laminæ—are all secreted by the coronary substance. I say so too, and expect to fully prove it.

Hoping that the intelligent reader fully understands my plain and concise definition of the organs composing the foot, I shall proceed to not only show, but prove, first, that the wall of the unshod foot expands under violent pressure, and contracts to its natural dimensions as soon as relieved of such pressure; secondly, that the frog, exercises but very little part in expanding the shod foot; and, thirdly, none at all in expanding the shod foot; fourth, that expansion is necessary to the healthy condition of the foot, shod and unshod; fifth, that the insensible sole is the chief organ which directly expands the wall, with, of course, the agency of other organs; sixth, that the present method of shoeing is barbarous; seventh, that the present shoe in use is, by its first application, indirectly if not directly injurious by sowing the seeds of future disease in at least the feet of horses used in quick action. It is true that horses used in slow action and not too heavily burdened may escape injury for an indefinite time, perhaps a few for life, without marked injury; but those ridden or driven rapidly upon hard surfaces are certain to receive injury, sooner or later. Scarcely is a horse used in quick action that is not the victim, more or less, of the old method of shoeing. The fact that every horse one meets is not lame and limping, is no proof at all that they are not suffering—both feet being equally affected, they cannot limp on either. For if a man stands at a crossing of two paved or macadamized streets, scarcely can he notice a horse trotted by him who throws his feet down independently, and with a

bold loose step, both feet being equally cramped. He does not limp on either, but ambles along, putting his fore-feet down as lightly as possible, and trying to keep his hind feet as far under his body as he can.

In proof of the above, I propose to take a four, or a three-year-old colt that never has been shod, and put one of the common shoes upon one of his feet, leaving the other bare, turn him on pasture, keep the same foot continually shod for six or twelve months, then put him to work upon hard surfaces, and he will be almost certain to limp on the shod foot, more or less, if driven fast. Especially will he limp if a shoe, nailed only on the outside, with one nail near the toe on the inner side, is put on the foot left unshod until then. This I know, having been experimenting upon the subject.

Again, take a horse having both fore-feet shod, and both contracted and corned, take off one shoe, and leave the other one on, work him at a plow and harrow, on dry ground, in dry weather. The unshod foot will be certain to get well, and the foot wearing the shoe will be no better, but will be most certain to grow worse.

Still further, if a horse has corns in both feet; and an expansion shoe is put upon one, and the common shoe on the other, the foot wearing the expansion shoe will expand and get well, and the other is certain to grow worse. This I have also experimented on both shoes.

In proving the above seven propositions, I shall call the reader's strict attention to the following simple fact, which I shall prove the entire seven by:

Take a sound-footed horse, cut his frog down as low as possible, so low that no action of his can make the part left untouched reach the ground, then put on a bar shoe, whose bar completely covers the frog, and so concaved that the frog never could reach it. Now, if the shoe is nailed only on its outside arm to the foot, and one nail at the toe on the inner side, put the horse to quick action for three or four weeks, and it will be found that the inner arm will be polished bright, and more or less elevated at the heel.

This proves at once the seven propositions: First, that the wall expands and contracts in quick action. Second, that expansion is necessary, else it would not expand. Third, that the frog has no possible agency in its expansion. Fourth, if the foot is nailed on both sides back to the heels, it cannot possibly expand. Fifth, that whereas the frog has no part in expansion, the sole is

the only means of expanding the wall, by yielding under the weight thrown upon its crown, it expands at its base, and forces the wall outward. Sixth the above being facts uncontrovertible, the old shoe which prevents expansion is barbarous in its application, and consequently sows the seeds of disease, more or less, by its first application.

If the above are stubborn facts, which they are, the next inquiry presenting itself is, what kind or form of shoe is best adapted to the safety and healthfulness of the foot. After all that has been written above, and the experience of intelligent veterinarians during this, the nineteenth, century, the answer is anticipated—a shoe which, defending the foot from wear and tear, also permits it to expand and contract as readily as does the unshod foot. With such a shoe in use, shoeing is no longer a necessary evil, as in the past, but a boon of mercy to the noble, useful servant of man.

From the fact that all men cannot comprehend science alike and, as remarked in advance, old habits and prejudices blind thousands of men's eyes and bind them to old theories to such a degree that I feel the necessity of proving beyond controversy that the sole is the organ that directly expands the wall, and that proves all that is necessary to prove or can be proven.

In proving this I am compelled to draw the reader's attention back to two facts; first, when the frog is elevated from the ground by cutting it away, or by thick shoes or high calkings, or shod with bar shoes, as described, the frog cannot possibly expand the wall.

If the reader still cannot comprehend and wishes further explanation, I take him back to the anatomy and physiology of the parts, and remind him of the many times I promised to further call his attention to the anatomy of the parts, and remind him that the sole is more or less concave or arched, and that it is firmly attached to the wall, all round its inferior border, a little above its ground surface (margin); that the sole is elastic and the wall slightly so; that the coffin bone is attached to the wall by elastic laminæ, dove-tailed into a like number upon the wall; therefore, can anything either in mechanism or nature more fully prove that, when weight is thrown heavily upon the coffin bone, the elastic laminæ extend and permit the coffin bone to ascend upon the sole, that organ being arched and elastic, readily recedes (sinks) under the weight from above, and in so doing, forces the wall outward at its base, and relieves itself of the pressure thrown upon its crown, and obviates concussion. The

navicular bone also descends upon the frog at the same time, that organ being highly elastic, also yields to the pressure upon it, but neither in shape or density has it the power to expand the foot —either of the unshod or shod foot—especially while elevated from contact with the ground. Its firm junction with the sole and its great elasticity is the only means by which it is able to give partial support to the perforous tendon and navicular bone, and to descend beneath the same pressure simultaneously with the coffin bone, the sole, on account of its arched form and partial elasticity, and the frog, by its great elasticity and its junction with the sole.

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(*To be continued.*)

ART. V.—PUERPURAL APOPLEXY.

History.—Parturient apoplexy, milk fever, dropping after calving, etc., is a disease confined almost wholly to the bovine species. England and Germany have lost many of their most valuable cows with this disease, notwithstanding the very best of care and medical treatment to which they were subjected. The animals most subject to this condition are those which have been pampered and fed upon stimulating diet, such as meal, beans, barley and corn, and have had too little exercise. As a rule, the animals most frequently attacked are the pure-bred animals, particularly the Alderneys. From them we can grade down the scale in pretty direct ratio as to liability, beginning with the best bred cows, in the highest condition and heaviest milkers, and ending with those without lineage and in the worst possible condition.

This disease is generally associated with parturition, and is often confounded with a form of paralysis dependent on entirely different conditions.

It is more likely to occur in warm weather than in cold, in good milkers than in poor, and one attack predisposes to another.

It sometimes occurs before labor, but not often. It generally makes its appearance very shortly after parturition, within the first three days, and not, as many suppose, three weeks after.

Pathology.—Septic poisoning, indigestion, nervous derangement, anatomical predisposition, metritis, encephalic anæmia and a variety of other conditions have all been assigned as the chief cause of the trouble. Our best authorities, however, ascribe it to disorder of the sympathetic nervous system.

In the milch cow this system is most highly developed. Alimentation, lactation and utero-gestation are under its direct control, and the influences are markedly manifest in the various secretory processes.

During parturition an excess of blood is thrown upon this system. There is sudden increase of blood-pressure, and congestions and apoplectic lesions result. The great volume of blood used for the nourishment of the fœtus in utero by the act of parturition is no longer required in the generative organs, and is cut off. The mammary gland, hitherto inactive, suddenly takes on great activity, accompanied with increased circulation and excessive secreting power. One system of nervous action thus becoming inactive, while another is as rapidly called upon for compensating activity. If any causes tend to prevent this vicarious or safety-valve action, congestion and apoplexy naturally follow in the part involved, which in this case is located in the sympathetic gangliated cord.

Symptoms.—The cow generally within a few hours after labor, becomes restless; there is swinging of the hind feet or a stepping action. The animal breathes quickly; is indisposed to move; staggers in walking. The eye is bright and staring, and there is a general appearance about the expression denoting cereberal excitement. She moves her ears spasmodically; there is spasmodic contraction of the facial muscles, grinding of the teeth, and evidences of great prostration. The lacteal secretions are lessened or entirely disappear. The sudden stoppage of the milk is a sign of great significance, and is almost pathognomonic of this disease.

The hind limbs gives way, and the animal falls and remains down. As the disease progresses the eyes protrude and become bloodshot, pupils dilated, and insensible to light, and there is general loss of sensation and voluntary motion. The bowels are obstinately constipated; urine scanty and high colored.

The pulse, in the earlier stage, is full and soft, and occasionally slow; in the later stage it is rapid, small and finally imperceptible; the respiration slow and infrequent, and finally stertorious; head and horns hot; animal frequently delirious, dashing the head about with great violence or becoming finally comatose: it lies with the head flexed on the shoulder.

The power of deglutition is greatly impaired or lost entirely; the bowels cease to act, and the urine is retained. Tympanitis is a constant symptom.

In fatal cases all the symptoms become more marked; the coma is deeper; the vitality lessens, and death closes the scene.

In favorable cases, the internal organs commence to resume their functions; the bowels act; the pulse is stronger; respiration more frequent, and gradually the patient recovers.

Relapses frequently occur. Convalescence is usually slow and, in some instances, there is a decided tendency to sloughing to the parts subject to pressure.

Treatment.—The most important consists in prophylactic measures. This consists in keeping up a due amount of exercise, and avoiding all kinds of food which tend to induce plethora.

In high bred animals, it is well to resort early to cathartic remedies (salines), and, if necessary, deplete with the lancet.

If, however, the case is not seen till the disease has already developed a full cathartic should be exhibited. I have found the following useful:

℞

Magnesia Sulphus,	℔ xii.
Pulv. Croton Seeds,	No. xxx.
Pulv. Zinzeberis,	℥ ii.
Pulv. Gentian,	℥ ii.
Aq. Puræ,	q. s.

If the patient is in the earlier stages, the abstraction of blood is decidedly beneficial and should be resorted to without delay.

The most important indication is to get the bowels to act. Very large doses are required often, to do this, for there is great tolerance of drugs in this disease.

Careful nursing is an absolute necessity. The patient should be well supported and bedded with clean straw and well covered with cloths, and friction applied all over the surface of the body. All

lacteal secretions should be removed regularly. Cold water or ice may be applied to the head, supplemented with full doses of whiskey, two pints every three hours, combined with two ounces of spts. turpentine, and hot water, if there is much tympanitis.

The action of the skin can be stimulated by the use of hot blankets, and the application of stimulating liniments along the spine.

If the power of deglutition is impaired, the medicine should be administered by the aid of the stomach pump. It is well, in those cases which tend to recovery, to confine the patient for some time to a gruel diet. Enemas aid cathartic action and the urine should be regularly drawn off with the catheter.

Resolution is more frequent in some parts of the country than in others, but the disease is peculiarly fatal in any section. During convalescence, tonic remedies are indicated, especially strychniæ and the iodide of potassium. Blisters along the spine are serviceable in cases of persistent paralysis.

The flesh of animals suffering from milk fever is not fit for human food, although there is no evidence that it will cause disease in animals fed upon it.

Post mortem Appearances.—Veins distended with dark-colored blood; petechial appearance of serous membranes; congestion of the brain and spinal cord with apoplectic clots in various parts, and occasionally an effusion of serum in the spinal canal, and spinal cord softened.

THOMAS ROBERTSON, M.R.C.V.S.

EDITORIAL DEPARTMENT.

HOMŒOPATHY IN VETERINARY PRACTICE.

THERE are in this city and in Brooklyn several veterinarians who profess to practice in accordance with the homœopathic dogma, that "like cures like." A small minority of veterinarians throughout the country do the same. These persons, so far as we can learn, may be divided into two classes: those who are too lazy or ignorant to practice any other way, and those who from experience have concluded that the domestic animals do not need much medicine of any kind; and they think perhaps that homœopathic medicines are harmless to the horse, yet reassuring to the owner.

It would seem as though in veterinary practice there might be some positive facts obtained either for or against homœopathy. Veterinarians have none of the bitter personal feelings on the subject which are possessed by so many human practitioners. It is and should be a matter of indifference as to the standing of a veterinarian what drugs he used, provided he uses them intelligently and honestly. Furthermore, it is claimed in human medicine that the effects of homœopathic drugs are largely dependent on mental influence. There can be none of this in veterinary practice.

We have made a number of inquiries, with the hope of learning something positive regarding the practical results of homœopathic drugs, when given to the lower animals. So far as can be ascertained, however, there is no homœopathy at all in their mode of administration, and there are no certain therapeutical results of any kind. A number of mother tinctures are given emperically. There have been no "provings," as indeed there could not be, to any extent. These "mother tinctures" (which are nearly as strong as fluid extracts) are given often, according to the indications furnished by physiological science. Thus, nux vomica is given for constipation; aconite and verdrum viride for fevers; bryonia in lung troubles, etc.; cantharides is given in kidney diseases; arsenic and camomile

in diarrhœa and colic, etc. The practice, in this neighborhood at least, seems to be one quite different from that laid down in a certain homœopathic veterinary manual which has been published for the guidance of the transcendentally inclined.

In fact, we are obliged to conclude that there is nothing to be learned out of veterinary homœopathy, unless it is that animals get well oftener than one would suppose, when left alone. An ignorant man had better practice homœopathy, because he can do no harm except in a negative way. An intelligent man will not practice it, unless he is a nihilist in therapeutics. And we believe that persons who are nihilists in therapeutics are those who do not understand how to give remedies.

It is not impossible that among the drugs used by homœopaths there are some which might be wisely appropriated by those of the regular school. This possibility should be borne in mind. Furthermore, there is no doubt that almost every remedy has a double action, according to the amount given. This, too, is a fact that homœopaths should not be allowed to monopolize.

THE CAUSE OF DEATH IN THE COLIC OF HORSES.—Dr. Immanuel Munk, of the Berlin Veterinary School, has made some suggestive experiments regarding the above subject. They are recorded in full in the supplemental volume of the *Archivs für Physiologie* for 1880.

It occurred to him that, in the colic to which horses are subject, the cause of death might be, in part at least, due to the absorption of carbolic acid and other products of fermentation in the intestinal canal.

He first made a series of experiments in order to determine the amount of carbolic acid excreted off daily in the urine. Eight healthy horses were taken and fed upon a fixed ration of hay, 4.5 kilos. (20 lbs.); oats, 2.5 kilos. (12 lbs.). The daily average of drinking water was 10 litres (11 quarts). We give the table of the averages of the eight experiments:

Average weight of horses, 406 kilos. (850 lbs.); average daily amount of water drank, in litres, 10.3; average daily amount of urine, in litres, 3.01; average total amount of tribomphenol, 10.886 grains (ʒ ii¾).

These experiments showed that a horse weighing 800 lbs. passed daily an average of 10.9 grains (ʒ ii.¾) of tribromphenol and 3 grains

(ʒ ¾) of phenol, making a total of about ʒ iiiss. of impure carbolic acid a day. Three of the animals were killed at the end of the experiments, and their intestines examined, but no carbolic acid found in them. On the other hand, the urine of horses that died of colic was examined and found to contain less than one-half the normal amount of the acid in question.

The intestines of the same animals were also examined, but no acid found. There were, however, chemical substances from which it might easily be developed.

Some further experiments were made to test the lethal dose of carbolic acid. In the case of dogs, a dose of four grains to the pound weight would produce sure and certain death.

We can not by any means consider that Dr. Munk has proved carbolic acid poisoning to be the cause of death in colic. Still, it may be one of the factors, and one that should be borne in mind, since this agent is a heart-poison.

State Veterinary Bureaus.—We have received from Dr. N. H. Paaren, State Veterinarian of Illinois, the first circular from his office. It contains the law enacted by the last Legislature under which a State Veterinary Bureau was created. It contains also a concise account of the leading symptoms in contagious pleuro-pneumonia, foot and mouth disease, malignant anthrax, and Texas or splenic fever. The facts thus given are such as ought to be familiar to every owner and dealer in stock. Their distribution cannot but have a beneficial effect.

The State Veterinarian, besides thus distributing information, has other important duties. These consist in keeping a careful watch over the herds and over stock-yards; also in examining cattle that are imported from the East. Quite recently the Governor of Illinois issued a proclamation forbidding the bringing of cattle into the State from regions affected with pleuro-pneumonia, unless these cattle had a certificate of health properly signed by a duly authorized veterinary inspector. Whether such a prohibition will or can be carried out is at present doubtful. But, at any rate, the object is a good one, and will lead to an agitation of the question of stamping out pleuro-pneumonia, which cannot but be useful.

It has already been shown that the State Veterinary Department of Illinois has a wide field for work. A great many will watch it

with interest, for if it succeeds in justifying its existence, as it no doubt can, a precedent which other States must follow will be established.

THE AMERICAN PUBLIC HEALTH ASSOCIATION AND VETERINARY MEDICINE.—The American Public Health Association is a national organization which, though young, already has gained a wide reputation through the public spirit and scientific attainments of its members. Its annual meetings are now watched with interest by the laity as well as the medical profession. It is a noteworthy fact. therefore, that at the annual meeting in November last, one out of the three days' session was devoted to comparative medicine. The list of papers read opened with one by Dr. Ezra M. Hunt, on "Contagious Diseases Among Domestic Animals." We publish it in another part of the JOURNAL, and gladly commend it to our readers as one of the most complete presentations of the claims of comparative medicine upon the State that has yet appeared.

The value of studies in comparative pathology, which has lately been so brilliantly demonstrated by Pasteur and others, is receiving every day a wider recognition. Articles upon this subject have lately appeared in the *Lancet*, the *N. Y. Medical Record*, the *Philadelphia Reporter*, the *College and Clinical Record*, and other journals. The *Southern Clinic* has established a veterinary department in its columns. A glance at the medical periodical literature of the different countries will show how frequently facts in comparative pathology are drawn upon or are contributed by students of the medical sciences.

DO SOUTHERN HOGS HAVE TRICHINÆ?—An investigation which seems to show that southern hogs do not have trichinæ was made by Dr. Jansen T. Payne, last summer. His report was submitted to the American Public Health Association, at its last meeting. In six months Dr. Payne examined 5,400 hogs, finding only 22 infected with the parasite in question.

The infected animals were reported as having been received from the following places: St. Louis, 18, Louisville, 2, and from the West, marked "unknown," 2, making a total of infected hogs, 22.

Of the hogs examined, only 529 came from St. Louis; most of them came from Louisiana (2,473), and Tennessee (1,060).

The observations lead to the belief, therefore, that southern-bred

hogs are free from trichinæ. Still, such a deduction is not absolutely safe. If the fact were really proved, it would be one of great advantage to southern pork-raisers. Even as it is, they can profit from the fact that Tennessee and Louisiana hogs are almost entirely free from disease.

Incidentally, some other facts regarding the origin and communicatibility of trichinosis were developed. Observations seemed to show that hogs infect each other when enclosed in the same pen, and do not depend upon the rat as an intermediate host. The parasite is passed out of an infected animal along with undigested food, and the food is then eaten by a sound hog, who in turn becomes infected.

By Dr. Payne's examinations it was also ascertained that all the hogs infected with trichinæ were corn fed animals. No mast-fed animal was found to be infected.

The following sanitary regulations were recommended:

An improved trough should be made to contain the food of the hogs, and corn should not be scattered over the floors of the pens, as is customary at present, for by this means the corn finds lodgement in the dung, and thereby becomes a vehicle of infection. The pens should be kept very clean. When one hog of a lot is found to be infected with trichinæ, the animals should be separated, and not more than one hog placed in a pen.

By a rigid system of inspections Dr. Payne thinks it possible to prevent the sale of fresh pork infected by the trichinæ spiralis.

Acute Jaundice in Sheep.—Researches made at the Veterinary School in Berlin have shown that acute jaundice may be produced in sheep by feeding them upon fodder containing lupine (pulse). This jaundice is due to an acute yellow atrophy of the liver, resembling very closely the same disease in man, as it occurs idiopathically or after poisoning with phosphorus.

When the sheep are fed for a long time on specimens in which the poisonous properties are less active, an interstital hepatitis develops.

The urine always contains biliary pigments, generally albumen and often hyaline and granular casts.

It is a remarkable and interesting fact that, in spite of the very great atrophy of the liver, the urine always contains urea or hippuric acid, while leucin and tyrosin are never found. One of the

strongest arguments for supposing that the liver breaks up leucin and tyrosin (themselves the products of the decomposition of nitrogenous bodies) into urea and its allies, lay in the fact that, in acute yellow atrophy, urea and uric acid disappear from the urine, while leucin and tyrosin are substituted. The inference has been that the functional activity of the liver being destroyed by disease, that organ could not manufacture urea out of the leucin and tyrosin supplied to it. It is evident that, if the facts above given are correct, some other explanation of the origin of urea, as regards the liver, must be given.

The lupine in question poisons, in a similar manner, the horse, goat and dog.

The toxic principle is insoluble in ether, alcohol and glycerine, is slightly soluble in pure water, and very soluble in alkaline solutions. It is thought to be either an organic acid or a glucoside.

English Veterinary Degrees.—The British Parliament recently passed a very important measure, looking to the protection of the veterinary profession. This act will have the effect of raising to the rank of other liberal professions that of the veterinarian, which has so long labored under the disadvantage of an unprotected title. It also enables those desiring treatment for animals to distinguish between a qualified surgeon and one who assumes the title without any education fitting him therefor, as all the students of the various medical colleges in the United Kingdom are required to pass a rigid examination by the Council of the Royal College of Veterinary Surgeons, and any person assuming the title of veterinary surgeon will be guilty of a penal offence, and liable to a fine of twenty pounds, with a view to treating justly and with consideration, practitioners of veterinary medicine who, by their skill and experience, have established a reputation. The act gives to such persons, if they have been practicing continuously for five years, the right to enroll themselves in the register of the College as "Existing Practitioners." Another very important feature of the act is that preventing any but qualified practitioners to recover in a court of law any fee or charge for performing any veterinary operation or for giving any veterinary attendance or advice.

Epidemic Catarrhal Influenza.—Exaggerated and sensational reports have been appearing in the daily papers concerning the epidemic which has been prevailing the last two months. The so-called mysterious "pink-eye" malady is nothing more than a catarrhal epidemic influenza, very common among horses at all times, but more frequent and severe during damp and changeable weather. The sudden atmospheric changes of the present fall have been of a character particularly favorable to the development of this disease, which has in most instances assumed a mild type. The sequelæ, however, have been of a more grave character and of a different type than we have had in some years.

The tendency on the part of some of our veterinarians to encourage the scare and misrepresent the actual character of the disease is certainly reprehensible. Let us have greater effort in the direction of a more accurate knowledge of diseases and greater skill in treating them, rather than ambition to get before the public, no matter how or by what process.

Equine Cemeteries.—A curious feature in Japan is the decay of its temples, on the one hand, and the scrupulous care and attention paid to its burying places, on the other. In the outskirts of many villages, writes Miss Bird, in her "Unbeaten Tracks in Japan," there are cemeteries even for the horses. These are enclosures, situated near the human cemeteries. There are mounds of earth over each animal, and often a head-board. Considerable attention is paid to these places; the grass is kept neat, and flowers are placed on the graves. The Japanese horse is not a very fast or very amiable animal. Nor is it very well treated by its owners. Indeed, the Japs pay more respect to the horse dead than to the horse living.

Discourteous Treatment of an Expert Witness.—Students of science everywhere cannot fail to notice with marked disapproval the efforts made by the prosecution in the great trial now going on at Washington, to depreciate the study of natural history, by applying the term "horse-doctor" to one of the distinguished expert witnesses, a well-known comparative anatomist and neurologist. It is

evident that the testimony of this expert must have been regarded as of great weight, or the District Attorney would not have resorted to so unworthy a device to weaken it. We frankly admit that we are not in full accord with the testimony of said expert, but we consider that it shows the extensive knowledge this, so-called, veterinarian possesses of the diseases of the human brain. If it can be ascertained that such erudition has been derived from the study of veterinary subjects, we would suggest that the Court recommend some of the other experts to turn their attention to the study of the lower animals. We refer especially to those who do not believe in the transmission of diseases from parents to offspring. They would not, we are quite sure, succeed as stock raisers if they insisted on practising those theories

CASE DEPARTMENT.

I.—MIXED CENTRAL SARCOMA OF THE LEFT HUMERUS, WITH SECONDARY DEPOSITS IN THE LUNG AND KIDNEYS.

REPORTED BY WILLIAM HENRY PORTER, M.D., V.S.

THE specimen was presented at the New York Pathological Society, of New York, with the following history:

The animal afflicted with this large tumor was a fine mastiff. Some six or eight months prior to death the dog was chasing a cat, and ran with considerable force against a stone wall. When the owner of the animal reached the spot, the dog was lying near the wall howling pitifully, and could not be induced to move. She was accordingly wheeled home in a barrow. The injury was located at the left shoulder. Though very lame, she commenced using the limb after a few days, and at the end of a week or ten days had apparently recovered entirely. A week or two later, however, she again became lame, and a small tumor was noticed for the first time at the point of the left shoulder. The growth steadily increased in size, lameness became more and more marked, until finally the limb was useless as a means of support, and she steadily lost flesh and strength. When first seen by Dr. Frank V. Walton, House Surgeon of the Columbia Veterinary College Hospital, to which she was admitted, the animal was walking on three legs and drawing the toe of the left fore-leg on the ground. There was a large solid mass covering in the shoulder-joint and extending backwards so that the outlines of the scapula and humerus could not be detected. This growth was surrounded by considerable œdematous swelling and œdema of the left leg.

A diagnosis of traumatic aneurism was at first entertained, but later it was thought to be a sarcoma of some kind. The animal continued to lose flesh and strength, although her appetite remained good.

On April 9th, 1881, an attempt was made, under ether, to remove the growth, but the animal died under the operation.

The limb was then removed entire, when it was found that the growth

seemed to spring from the humerus at the junction of the upper and middle thirds, at which point the bone was broken. From this central point the neoplasm radiated out in a centripetal manner, as is common in the periostial sarcomata. The tumor, which was surrounded by a thin fibrous capsule, extended above the superior end of the humerus, reaching into the infra spinous fossa. The growth was about nine inches long and five in diameter; at its superior extremity there were two large cysts containing bloody fluid. These cysts had smooth walls like the inside of a blood vessel, but careful examination failed to detect any communication with the blood vessels. There was also a small spiculæ of bone in the mass of the tumor, but none in the capsule. From this fact. together with the changes in the humerous, the growth was regarded as a central and not a periostial growth.

Examination of the internal organs revealed secondary deposits in lungs, kidneys and in the spleen ; the liver was free from any secondary deposits.

The humerus, both above and below the fracture. was condensed, and the medullary cavity was completely obliterated. That portion of the infraspinous fossa against which the tumor rested was thickened and roughened, covered by numerous bony projections. After macerating the scapular all its surfaces were found covered by rounded bony projections, varying in size from a pin head to that of a small marble. The secondary deposits in the internal organs give good ground for believing that those on the scapular are sarcomaous and not simply inflammatory in origin.

Microscopical examination was made at the School of Histology, in connection with the Columbia Veterinary College and School of Comparative Medicine, by Prof. Wm. H. Porter. The tumor was found to be made up principally of various elements conforming to the connective-tissue type, the oval and round corpuscles being the predominating variety, though a few spindle and myeloid bodies were also noted. The secondary deposits were entirely of the round-cell variety.

The case is of interest, because it is probably the first one of the kind in the dog on record, although this form of malignant growth has been met with in others of the lower animals. Second, in adding still further proof that the disease of man and animals are quite similar. Third, that the growth seemed to follow directly after the receipt of severe injury. Fourth, it is of interest in connection with a case of secondary carcinoma of the kidney in a human subject, presented by Dr. Wendt at the Pathological Society, in which the secondary deposits were superficial in the kidneys, the same being true in all the organs in this case. It is also of interest in connection with the case of sarcoma of kidney in the cow, previously reported in this journal.

II.—SUDOR CRUENTUS, OR BLOOD SWEATING

REPORTED BY JOHN N. NAVIN, V.S.

The strange horse disease which I mentioned in my letter to you is a most singular one, at least to me; one which I never read of or met with. The one I saw, a four-year-old, half-breed Clydesdale colt, untrained. The only visible symptoms were an inclination to keep lying down constantly and frequency of his pulse, which marked 70. Eat hay while kept up, but on being left alone, resumed his favorite attitude; by turning round much in the fashion of a dog, evidently stiff, but after once or twice turning round, dropped down and continued so until urged up. The owner remarked that he had not yet commenced to sweat blood, and on expressing my surprise at the revelation, both the owner and his man assured me that those horses which died, one, a mare on the farm, sweated blood which, when scraped up on to a plate with a knife, appeared like water mixed with one-third the quantity of blood; that for three or four days, while the mare lived, it became darker and thicker, I mean more blood and less serum, until death, which, if I remember correctly, was four days, the duration of the disease being about seven days. The owner remarked to me that the colt had not yet arrived at the period at which all the others had commenced to sweat—first a watery fluid, which soon changed to a reddish color—and that they seldom stretch out in the first stage of the disease.

Before being told of the bloody effusion I inquired if a post-mortem examination revealed any strange character in any of the internal organs. The owner said that the heart of the mare contained a mass of yellowish, jelly-like mass. On stating my opinion that she had died of clot in the heart, which, when it broke from its walls, caused death by being forced into the lungs, he told me that he cut the wall of the aorta and other arteries off from their connection with the heart, and found that what they contained resembled a tallow candle more than any other thing, but more yellow in color. It lengthened and contracted like India rubber or a spiral spring, and would stretch one-fourth its length, when pulled, before breaking.

On expressing my surprise at what became of the red portion of the blood, he then related the passage of it through the pores of the skin, and other farmers who lost stock by the same disease related the same symptoms. I gave tincture of aconite, spts. vini rect. and tr. belladonnæ to lower the pulse, and iron, hoping to correct the division of the constituents of the blood—in fact, I misunderstood the nature of the disease entirely.

I told the owner of the horse to write me daily; that, if necessary, I

would visit the horse, and that should he die I would not charge for investigating the case, but I never since heard from him.

INDIANAPOLIS, Ind.

A disease has been met with in human beings of rare occurrence, under the name of Sudor Anglicus, which, when very severe, is accompanied by hemorrhagic perspiration. This disease first appeared in England in 1486, and recurred at intervals until the middle of the sixteenth century. This form is said to have terminated either in death or recovery in twenty-four hours. The disease again recurred in 1821, and was described at length by M. Rayner. When the perspiration was dark in color or blood-stained, it was called Sudor Anglicus Niger, or black English sweating sickness. It seems, better, however, to apply the name "sudor cruentus," or sweating of blood, or bloody sweating, hemorrhage from the skin. Both the French and Germans have observed this disease, but it seems to have been limited to small geographical territories. As the intervals between epidemics have been long, many writers have never met with a case, and therefore infer that it never occurs.

The anatomical lesions in the human subject seem to be a little different from those hinted at by Dr. Navin. It is a great pity that necropsies could not have been made in these cases, and the gross findings worked up microscopically, for it is from comparative pathology that great advances in medicine must spring.—[ED.

III.—SCIRRHOUS CARCINOMA OF THE BLADDER.

REPORTED BY GEO. M. PARKINSON, D.V.S.

Grey gelding, æt. 16 to 18. Thin in flesh. This animal had been in poor health for one year previous to death. During the last year of life he was subject to repeated attacks of colic. The horse was turned out to grass.

About three years prior to death the gelding had turns of standing with outstretched limbs, apparently straining with a desire to micturate. From these symptoms, however, he apparently recovered in a few weeks and experienced no further trouble until one year before death.

Prior to October 14th, 1881, the horse had been treated by a so-called veterinary surgeon, not a graduate of any medical school.

October 14th I first saw the animal and learned that the only previous treatment had been diuretics, probably some of the bromide salts.

Symptoms: Pulse 40 and very feeble; respiration not disturbed; abdomen distended, the animal having just drank a large quantity of water. There was an œdematous swelling of the sheath and of the tissue on both

sides of the linea-alba as far forward as the posterior limit of the sternum. There was a discharge from the nostrils; the visible mucous membranes of a bluish or copper color; appetite poor. I noticed that the animal made frequent attempts to micturate, passing with each effort only a small quantity of urine, which often contained small blood clots These phenomena evidently caused the horse great pain.

I made a rectal examination, but failed to find the distended bladder as normally recognized in rectal examinations, but instead there was a large mass or tumor of the bladder. This neoplasm lay to the right of the median line just anterior to the sympathis pubis. Upon compressing the tumor the horse groaned as if from pain and simultaneously passed a small quantity of urine containing several small coagula. I diagnosticated malignant growth of the bladder, probably carcinotamous in character, and gave a bad prognoses. No special treatment was instituted further than rest in open pasture.

October 25th, the animal became so weak that, when down, he could not regain his feet, and consequently was killed.

NECROPSY, a few hours after death. The *abdominal* cavity was well filled with a fluid having a strong uriniferous odor. Both viceral and parietal layers of the peritoneum were studded with tubercle-like masses, varying in size, and probably representing infiltrated retroperitoneal glands. The mesentery and omentum appeared as solid masses, replaced or formed by these new formations. The liver and spleen were both much enlarged, and also had these small neoplasms upon the surface, resembling the omental growth, but in neither case involving the gland proper. Upon microscopic examination the liver was found to be pygmented and slightly cirrhotic The stomach was full of fluid which contained a little grass; the mucous membrane of a deep yellow color, probably post mortem biliary staining. The inguinal, as well as the retroperitoneal glands were enlarged, and apparently by extension of the new growth.

The genito-urinary tract and the glandular enlargements were sent to the School of Histology in connection with the Columbia Veterinary College and School of Comparative Medicine, for examination by Prof. Porter, who rendered the following report: When the genito-urinary tract was opened, the bladder was found to be nearly closed by a papillary projection springing from the right side. This papillary or cauliflower excresence was ulcerated at points. In the wall of the bladder and to the right there was a large hard mass. The whole pelvic peritoneum was studded with small tumors. A large portion of the omentum was made up of a mass of these small tumors, ranging in size from a pea to that of an English walnut. The microscopical examination revealed the same appearance as we commonly find in the scirrhous carcinoma; that is, irregular alveolar spaces filled in an irregular manner with large nucleated epithelial corpuscles.

IV.—RETICULATED ROUND CELL-SARCOMA OF THE ORBIT, WITH SECONDARY GROWTHS INTERNALLY CONTAINING MELANOTIC DEPOSITS.

REPORTED BY WILLIAM SOULA.

Gray mare, æt. 12. There was first noticed a small tumor over the left eye-ball, apparently growing from the orbital wall, twelve months prior to death. During the first few months it grew very slowly.

In May, 1881, an incision was made into the tumor to determine positively whether it was solid or contained fluid, blood oozed from the puncture, but the mass was solid. During the next four weeks the growth gradually increased in size. Late in June it was again cut into and a small portion removed for microscopic examination. "The examination of this small portion showed that the growth was sarcomatous of the large round cell variety with a slight tendency to an alveolar structure. No melanotic spots were found as we so frequently meet with in tumors of the eye and in various parts of the body in white and gray horses."

"At this time a diagnosis of sarcoma was rendered, advising an early operation. The prognosis given, however, was that the animal would be improved by the operation, but that it would return at the original site or internally."

After this partial removal, for two months, the mare continued in fair condition, worked every day, but the growth continued to enlarge slowly.

In the early part of October she suffered from the disease known as "pink-eye," being unable to work for about ten days. By this time the growth had attained considerable size, was growing more and more rapidly, pushing the eye-ball forward, filling the orbit, and was causing the animal a good deal of pain.

She was, however, again put at her work, and accomplished the same with ordinary ease. From this time on it was noticed that she gradually lost flesh and strength, probably from the pain and annoyance of the orbital growth as well as from general disease.

October 23d, 1881, the animal was totally unfit for duty, and an operation was decided upon. The tumor, which was quite firmly attached to the orbital wall and completely filled the orbit, so that the eye-ball, in fact the whole contents of the orbital cavity, was removed by Dr. E. Benj. Ramsdell. The animal suffered severely from shock, but rallied completely at the end of a few hours. The wound was brought together by a few sutures, and cold dressings applied. The wound healed kindly with scarcely any suppuration. The animal improved so rapidly that two weeks after the operation she was again at work. For a few weeks she gained in flesh and strength.

Two weeks after she was at work, it was noticed that the breathing was hurried and impeded. This interference with respiration gradually increased until December 10th, 1881, when the animal was no longer able to work, and was placed in the hospital.

Two days later a physical examination was made, and revealed fluid in the left pleural cavity. A few days later a small quantity of fluid was detected in the right pleural sac. Four days before death the left chest cavity was aspirated, and one gallon of clear serous fluid drawn off. After the removal of the fluid marked and extensive consolidation of the left lung was diagnosticated, and thought to be due to secondary deposits, as none of the rational symptoms of pneumonia were present. Some consolidation was also detected on the right side. The left pleural cavity rapidly refilled with fluid, and the animal died four days later, or on December 21st, 1881.

"*Necropsy* a few hours after death. The wound of operation remained perfectly healed, and no evidence of return of the growth was present.

"*Thoracic cavity.*—The right pleural cavity contained about eight gallons of clear serous fluid; the left fully as much, if not more. The diaphragm was a thickened mass of new growths. The costal pleura was covered with rounded tumors, varying in size from that of a pea to that of a hen's egg. The right lung was thickly studded with pinkish white masses, varying much in size. Most of the growths, but especially the smaller ones, were of soft consistency; some of the larger masses seemed to contain fibrous elements as well. New growths were distributed through the left lung, over the left costal pleura and in the left diaphragm, but were more abundant than upon the right side.

"Some of the abdominal organs seemed to be involved, but owing to the incompleteness of the necropsy, nothing positive could be determined relating to the same.

"*Examination of the tumors*, by Prof. William H. Porter, at the School of Histology.—Macroscopically, the tumors were whitish in color, mottled with a pale pink, in some, dark (almost black), spots were present, as if they were deeply pigmented. The smaller masses were very soft when isolated and easily broke down under the slightest pressure. When only a single neoplasm existed at a given point, it seemed to be encapsulated by a thin layer of distinct tissue.

"*Microscopic examination.*—Scrapings of the juice from the cut surface showed only large round connective tissue and blood corpuscles. Sections from the tumors showed, at points, a distinct reticulated structure closely packed with these large round cells. At other points large round cells, imbedded in a homogeneous matrix, was all that could be seen. The growth resembled somewhat a medullary carcinoma. The growths, however, were very vascular and contained numerous extravasations of blood. The

black points recognized by the naked eye, appeared under the microscope like the deposits found in melanotic sarcoma. It was, without doubt, blood pigment, and not masses of carbon particles, so commonly met with in the lung tissue. In sections made from the tumors found in the lung substance, numerous yellow elastic fibres were seen running through them, also, in some instances, the true pulmonary tissue. This condition would readily lead one to suppose that the new material had been deposited in and around the vesicular or lung tissue, and not primarily at its expense. In some of the large masses considerable fibrillated connective tissue had been developed, forming numerous bands running in various directions. This is one of the most malignant forms of sarcoma met with.

"The microscopic appearance of the primary tumor in the orbit and the secondary deposits were almost identical."

[This specimen is of special importance to the comparative pathologist and also to the veterinary practitioner. It is a third specimen of sarcoma which has been examined at the School of Histology in which the growth differed in each case, so that we have already met with three distinct varieties of sarcoma that are common to man. They also came from different kinds of animals, as the dog, cow and horse. In this connection it might be well to state that we have also met with a carcinomatous growths in the cow and horse. This, however, is not the first time we have seen a sarcoma in horses. This case, in connection with other cases reported in this number and previous issues, show that the various forms of malignant growths known to occur in man are probably quite as common in the lower animal, and consequently calls for a closer observation on the part of the veterinarian, thus giving increased impulse to comparative pathological study, and the advancement of comparative medicine, for true advance depends upon a more thorough pathological knowledge of the diseases of the lower animals, and until then progress will be slow.

This case is of marked surgical importance, and brings up many interesting points which the surgeon cannot learn too quickly. The improvement, even after the late removal, can teach but one thing, which is that all tumors must be removed early if we wish to attain the best results possible. In dealing with malignant growths this rule should never be forgotten—*cut wide outside the growth*—for pathological examinations so often reveal the fact that only the major portion of the growth has been removed, thus leaving behind a nucleus, as it were, for a rapid recurrence. In this case you will notice that the whole orbital contents were removed, and the tumor did not return in the orbit. It seems quite just in this case to infer that the internal organs were invaded at the time of the operation.

In view of that, however, the operation was certainly justifiable; the only mistake was in not operating earlier. We think every one can clearly see that the mare's condition was temporarily improved and that she was re-

lieved of great suffering, and the life and usefulness of the animal was prolonged.

Some might argue that if you remove a malignant growth it will return, either in the original site or internally. This, however, is not a good reason for not operating, for it has been found that repeated operations do prolong life, and in case it returns internally it is a great blessing, from the well-known fact in human medicine that these internal growths cause less suffering than the external. And it seems to me that it should be the grand purpose of every veterinary surgeon to devote his life to relieving the sufferings of lower animals in every way known to a rapidly advancing science.

The case is also of interest in a medical view, showing how accurately diseases of the chest cavity can be diagnosticated by the aid of a thorough knowledge of physical diagnosis. It also shows that the contents of the chest cavity can be drawn by the aid of an aspirator, with very little, if any, danger of the fluid becoming purulent as a result of the operation.—Ed].

V.—TWO CASES DIAGNOSTICATED AS MILK FEVER.

REPORTED BY B. C. SEERS.

Milk Fever.—This disease is probably as fatal as any which the dairyman has to contend with. Our habit of feeding heavily on Indian corn and other rich food, for eight months in the year, makes our cows more liable to this malady. The symptoms of this affection are generally an entire stoppage of the flow of milk, accompanied by all the symptoms of fever, which varies in intensity. After a few hours the animal acquires a staggering gait, with a want of muscular power in the posterior extremities.

I have found in the majority of cases no remedy so serviceable, provided the case is seen in an earlier stage, as free bleeding, say from five to ten quarts, according to the size and flesh of the animal, and the type of fever. The amount of diminution in the milk secretion should also be considered in reference to treatment.

We have had two similar cases during the past summer, which we treated alike. The result, however, in the two cases was not alike; one case recovered, and the other died.

I report the two cases, and subject the same to criticism, on account of the trouble which we have in dealing with the severe cases.

Case I.—The first animal attacked was a large common cow, who calved rather early, and at the time of her illness was secreting less than the

average quantity of milk. Without apparent cause, some two or three weeks after calving, the flow of milk suddenly stopped; the horns and ears were quite warm at the base, but unusually cold at the tips. The mouth was very hot, the eyes red, the Schneiderian membrane dry, and the nostrils were partially filled with a scaly discharge. The cow staggered about, and soon fell down from loss of power in the posterior extremities.

At noon, bled the cow, allowing some six quarts of blood to escape, and gave, per orem, one ounce of the nitrate of potass (saltpetre). At four o'clock P. M. of the same day, the cow still continued to be very sick; the breathing was hurried and short. She noticed but very little around, but drank a little water. At dark, no better. Nine o'cloek P. M., the animal noticed my approach, and was better. The next morning she was able to walk about, began to graze, and in two or three days was giving as much milk as ever, and has remained well up to date.

Case II.—This animal was a grade Jersey, about eight years old, in fair flesh; she was a good milker, giving a fair quantity of rich milk. This cow was taken sick out in the field two or three days after calving. The following notes were taken at the time. Saturday morning, September 10th, 6 o'clock A.M., I found the cow down and unable to rise. I bled the animal, allowing three or four quarts of blood to escape. The hemorrhage was arrested when a change of color was noticed in the blood from a dark to a light red. To this animal one ounce of the nitrate of potassium (saltpetre) was given, but in the crystaline form. At 2 o'clock P.M., the cow was worse, pulse 80 per minute. Bled again, allowing four or five more quarts of blood to escape. At this point the pulse softened very suddenly, and the hemorrhage ceased spontaneously. The animal now appeared very sick, the conjunctiva no longer sensitive to the touch, and the head laying to one side as if the cow was dead. Administered one pint spiritus mallati (apple whiskey), and one ounce pulv. zinzebar (ginger). This dose was repeated at 7 o'clock P.M. At this time the animal could scarcely swallow; pulse, 80 per minute, regular but very feeble. The secretion of milk was not totally arrested, but some flowed during the whole sickness.

Sunday morning, appeared a little better, noticed attendants and swallowed readily. Gave half pint spiritus mallati, one ounce of pulv. zinzebar, and one half quart of raw oleum lini (linseed oil). Drank some water during the day. P.M., still better, gave another pint of whiskey and had her covered with a blanket.

Monday morning, cow walked a half mile to the home barn; bowls remained constipated. Gave another quart of oil, which moved the bowels freely. Fever still continues; no appetite; gave but little milk. Ordered bottle of old hard cider, with one drachm of pulv. zinzebar, night and morning. Tuesday, ordered condition powders, such as are commonly

given to horses, one to be given twice daily. She, however, never ruminated or ate anything. The fæcal discharges continued to be dark and thin. The fever continued and the animal died on the fifteenth day of the disease.

Now, why did not the treament which cured the first cow cure the second? Was the dose of saltpetre too heavy? Should the bleeding have been carried further at first (I think so), and did the cow die of typhoid fever? If so, what would have been the remedy?

Any or all of these questions I should be glad to have answered by yourself or correspondents, together with a full criticism of the treatment, or so much of it as you may think of enough general interest to print.

BLOOMING GROVE FARM, Orange Co., N. Y.

[The first case, as above reported, differs markedly from milk fever. It, however, simulates the condition known as congestion of the brain and spinal cord with the paralysis common to that condition.

The exciting cause of the first case was, in all probability, engorgement of the rumen with food and a slight catarrhal fever.

Milk fever is not usually developed three weeks after calving, neither is the recovery so rapid. Very few animals can get up even after the second day, much less can they walk.

The second case, as reported, was probably milk fever. Should judge the case was rather far advanced for such heroic measures as bleeding, etc. Generally such cases do better under the *action* of stimulants and tonics.

The difference in the result in the two cases was probably due to the original diseases being different. We should be inclined to regard the second case as true milk fever, and not typhoid, although it may have assumed a typhoid character.

In reference to the use of the nitrate of potass, we do not see the indication for its use. It is one of the most powerful and irritating saline diuretics, but in this case no reference is made to an interference with the functions of the kidney. Therefore, we should positively say that it was counter indicated. In case there was reason to use a diuretic, we would in all such cases advise the use of non-irritating diuretics in preference to the irritating. —ED.]

VI.—ABDOMINAL DROPSY COMPLICATING PREGNANCY.

REPORTED BY E. T. HAYGARD, V.S.

Visited short-horn cow belonging to Mr. G. Whitney. She was supposed to be about a month from calving. In fair condition; abdomen much distended;

some œdema of hind legs; considerable difficulty in breathing, especially when lying down, and increased materially during the heat of the day; micturition irregular and in small quantities, but general health good.

The indications were uterine or abdominal dropsy, but as the period of parturition was approaching, it was not considered advisable to submit the cow to an examination, vaginal or rectal, until after that time. In the meantime diuretics were prescribed and directions given in regard to diet, etc.

On the 26th Mr. Whitney reported the cow worse. On visiting her it was seen the distension had materially increased and the breathing had become so difficult that suffocation was imminent. There was no preparation for calving, no springing of the udder, no swelling of the vulva or relaxation of the pelvic ligaments. On examination by the rectum the uterus could be distinctly felt, and in it a rounded irregular mass, which to the feel had the appearance of a tumor or a fœtus arrested in its development and enveloped in its membranes. The uterus being so distinctly felt, and its only contents apparently being the mass described—although the whole appeared to be floating in fluid—together with the evident fluctuation of fluid in the abdominal cavity, lead me to the conclusion that the effusion was limited to the peritoneal sac. Paracentesis was determined upon, the puncture being made on the right side, in front of the udder, and about five or six inches to the right of the umbilicus. It was calculated that not less than forty-three gallons of serum were drawn off. The cow bore the operation well, and a few minutes after the administration of a stimulant appeared quite ready for her usual allowance of food.

The day after the operation a dead fœtus was expelled. I did not see it, but it was reported to me as corresponding in form and description to the mass I felt in the uterus before the operation. Alternate doses of tonic and diuretic medicine were prescribed, and the cow is now reported to me as quite well.

LEXINGTON, KY., October 9, 1881.

[The outlines of this case would lead one to infer that it was one of ascites due to portal obstruction. As the urine was not examined, it is impossible to draw any positive conclusion regarding renal causation. Albumenuria is quite common during pregnancy in human subjects, and may be in lower animals. Careful analysis of the urine, however, has not had the attention which it deserves in comparative medicine, and until it does, many diseases must pass undiagnosticated.

The diagnosis in this case seems to lie between intro-uterine dropsy and abdominal dropsy, probably the latter.

This case might be classed under the head of a missed-labor with the secondary accumulation of fluid in the abdominal cavity.—ED.]

VII.—COLITIS; PRECEDED BY ACUTE DIARRHŒA.

REPORTED BY MARK L. FREY, D.V.S.

November 10th, I was called to see a horse, with the following history:

November 9th, at about five A. M., it was first noticed that the animal frequently discharged, after considerable straining, half-fluid, clay-colored fæces of an offensive odor; also, refused to eat, eye dull, great thirst and rapid emaciation and debility.

The following medicine was administered by the groom:

℞
Oleum Ricini, ℥ iv.
Tincture Opii, ℥ ii.
Oleum Cini, Oi.

This was given twice that day, followed by warm water injections per rectum. The following morning, the owner seeing that the animal was apparently worse, sent for me.

Upon examination I ascertained that the discharged fæces were tinged with blood and pus; there was considerable straining at the anus and of the rectum upon attempts to evacuate the bowels. There was pain in the abdominal region; dullness of the eye, great thirst, urine frequently discharged, of a high color and of high specific gravity; malassimilation of food, and a general debility. The urine contained large quantities of urea, due to the rapidity of tissue metamorphosis.

Diagnosticated Colitis, preceded by an acute diarrhœa.

Treatment:

℞
Pulvis Opii, et.
Pulvis Galli, et.
Cupri Sulphatis, āā, ℥ ii.
Mx. et. fiat in chart No. 2.

Sig. twice daily by mouth.

Also:

℞
Pulvis Opii.
Plumbi Acetatis, āā ℥ ij.
Aquæ Amylum, Oij.

Mx. sig. ½ to be thrown up per rectum, by the syringe, the second half to be used at the end of one hour.

The following day ordered for the debility:

℞
Pulvis Opii, ʒ ss.
Spiritus Frumenti, ℥ ij.

Mx. sig.; twice daily.

The above plan of treatment was faithfully carried out, and the animal made a speedy recovery.

VIII.—ACUTE ARTICULAR RHEUMATISM SECONDARY TO CATARRHAL INFLUENZA.

REPORTED BY H. A. BERES, V. S.

November 7th, was called to attend a bay mare, aged six. She had been suffering from a mild attack of Catarrhal Influenza, from which she had been convalescing for several days.

Suddenly (a few hours previous to my first visit), she had been seized with stiffness; inability to move. I found all her joints swollen and inflamed, profuse diaphoresis, and symptoms of excruciating pain; pulse full and rapid. Diagnosticated Rheumatic Fever. Although in a comfortable stable and well cared for, she seemed the picture of agonized suffering. For forty-eight hours I followed the usual line of treatment with no abatement of symptoms.

While considering what next to do, I recalled a cure reported in the earlier number of the JOURNAL, and concluded I would try Salicin. Drachm doses were ordered every two hours, till the symptoms lessened. The result surpassed my expectations. In six hours the patient was free from pain; in ten hours she could lie down naturally and comfortably. The fever abated, the inflammation and swelling of the joints subsided, and in forty-eight hours she was apparently as well as ever. Salicin seemed to act so much like a specific in this case that I hope others may be induced to test its virtues as an anti-rheumatic remedy. It has been rather unusual in my experience for Acute Articular Rheumatism to follow Catarrhal Influenza, and I certainly have never had such magic results follow when I have prescribed other remedies in this disease.

BOSTON, Mass.

IX.—PROBABLE CARCINOMATOUS TUMORS ENCROACHING UPON THE ALIMENTARY TRACT.

REPORTED BY DR. E. P. BOWMAN.

A mare, 18 years old, owned in Boston, and a roadster of previously good repute, was observed to have less than her usual spirit when taken from her winter quarters last spring. Her appetite also was poor, and the bowels were constipated. Not much attention, however, was paid to the matter until about three weeks ago, when I was called to the case. On examination, I found the pulse, temperature and respiration normal, but there was a slight yellow tinge to the mucous membrane of the mouth and tongue, and conjunctiva of the eye. The upper and lower molars, also, were unusually sharp, so much so as to cut the tongue and cheeks. Judging that this condition might have caused the symptoms alluded to, I dressed the teeth. She was then sent into the pasture field, where she fed heartily for a day or two. On August 24, I was again requested to see her, and found the following conditions: Pulse 60, temperature 100, respiration 20; vision imperfect; the yellowish tinging of the conjunctivæ more marked than at my first visit; decided nervousness, and some thirst. I ordered bran-mashes with laxatives, following them up with an active purge. On August 28, pulse, temperature and respiration were normal, and the conjunctivæ were clear; appetite poor, and a tonic ordered. On August 30, I found the animal lying down, and unable to rise. She was bathed in a profuse perspiration. Foreseeing a rapidly fatal termination, I recommended that she be put out of the way as soon as possible.

At post-mortem examination, the following facts were revealed:

After exposing the abdominal cavity, about three gallons of a servous fluid escaped. On inspecting the intestines, I expected to find that foreign bodies had given rise to the trouble, as in my experience carpet tacks, shingle-nails, or even large intestinal calculi produced symptoms somewhat analagous to those described in this case. I found, however, that the whole attack was mainly attributed to a stricture of the gut, caused by two tumors that pressed upon and partially occluded it. A microscopic examination was made of the growths, and, indeed, the autopsy was conducted rather hastily, owing to the heat of the weather. In my opinion, the disease was cancerous, and I judge so by the hardness of the growths and their known proclivity to attack these parts.

LYNN, Mass.

[NOTE.—If specimens similar to the above-described will be sent, preserved first one week in Müller's fluid:

℞

Potassium Bichromate,	2 parts.
Sodium Sulphate,	1 part.
Aquæ,	100 parts.

Mx.

And then, after washing in water in 95 per cent. alcohol, to the laboratory of the Columbia Veterinary College, 217 East 34th Street, they will be examined, and a report of the examination and of the case inserted in the columns of this journal.—ED.]

X.—CONVULSIONS IN A BEAR.

The Superintendent of the Zoölogical Garden, Elberfeld, Germany, describes, in *Der Zoölogische Garten*, the sickness of a brown bear, as follows:

The first symptoms were a loss of appetite, taking no nourishment, with the exception of a piece of sugar, the eating of which seemed to cause it pain. A severe diarrhœa followed, while the eyes became expressionless and the nose hot and dry. On the second day it was suddenly attacked with violent cramps, which seemed to affect the whole body. These spasms occurred every hour. The symptoms seemed to indicate poisoning by strychnia were it not for the severe diarrhœa. It was noticed that it tried to bite the iron bars of its cage, and this lead to the idea that the nerves of the teeth were affected. The remedy prescribed was 2 gramms of bromide of potash, mixed with pulverized sugar, five times every two hours. This gave relief.

[This is certainly an interesting case, but we do not see why the diarrhœa contra indicates strychniæ poisoning, for it is a well-known fact that this is one of our strong holds in stimulating peristaltic action. The convulsions may have been due to indigestion. Possibly the animal would have recovered as quickly without the bromide.—ED.]

XI.—LAPARO-HYSTEROTOMY.

G. Herz, V.S., writes, in the *Wochenschrift fur Theirheilkunde und. Vielzucht*, on the Cæsarian operation performed on a cow. I found the cow suffering from dropsy, with a good appetite and due to calve in about

eight days. Advised owner to wait that time, and then kill the cow. After ten days she was taken violently ill, and symptoms showed that death was near. Ascertaining that the calf was alive, I decided to perform the cæsarian operation. Laid the cow on her left side, and to save her from pain had her throat cut. After she had lost blood enough to become benumbed, made an incision thirty-five inches long in the right lower flank, beginning in the rear, cutting upwards, then forward and down, when a large quantity of water, which was in the hollow of the stomach, emptied itself. The womb was opened in the same manner, with the same length of cut, and the fœtus, which laid with its hind quarters towards the natural opening, was taken out. The calf, a male, was of strong build, but was afflicted like the mother, with dropsy of the stomach, which showed itself by the hanging down of the belly. Dropsy in the cow was caused by chronic heart disease.

[This case is similar to the one reported by Dr. Haygard, Case VI., but the necropsy revealed that cardiac lesions were the cause of the ascites. In such cases we would advise the trial of paracentesis abdominalis before resorting to the Cæsarian section. In this case reported by Dr. Herz paracentesis probably would not have saved both cow and calf.—Ed.]

CORRESPONDENCE.

EDITOR JOURNAL OF COMPARATIVE MEDICINE AND SURGERY:—

YOUR well-known interest in all that pertains to the subject of veterinary science prompted the following thoughts on the subject of "Distillery Slops:"

I do not know as I can add anything new concerning our knowledge ot this matter, but it has seemed to me that if each of us who practice the profession of comparative medicine would contribute such thoughts and items of interest as come in our way that we might do very much to add to the interest and instruction imparted by your ably conducted journal.

The popular idea seems to be, especially in this region, where "brewers' grains" are commonly used, that they are not the most perfect food for animals, simply the cheapest and most profitable. It is also generally understood that they induce diseased conditions, and that the flesh and milk of animals fed on them is unwholesome and deleterious to the human family. One of our leading papers, the Buffalo *Express*, in a lengthy editorial on the subject of feeding cows "sugar meal" (refuse from the glucose factories) and "distillery slops," asserted that milk produced by cows thus fed was absolutely poisonous to children, as well as detrimental to young animals of their own kind.

Let us see what are the facts in the case. "Distillery slop," when fresh from the still, is only *slightly acid*, provided that the mash has not been allowed to get sour before distillation. If, however, it has been allowed to become very sour, it becomes very rich in lactic and butyric acids, *which acids do cause derangement of the stomach and bowels of animals fed upon it.*

Again, as ordinarily obtained, this slop contains a small proportion of the starch of the grain used in the mash, and also a *notable* quantity of dextrine, which results from the alteration of starch, under the influence of the malt which is used. Dextrine, unlike sugar, cannot be fermented into spirit under the action of yeast.

Dextrine is as nutritive to animals fed upon it as starch, and is much more easily digested. The "distillery slops" also contain, in addition to dextrine and starch, almost all the so-called nitrogenous elements, those which constitute the flesh-forming ingredients of the ordinary grain fed to animals. Theoretically, then, these slops, or "brewers' grains" ought to be whole-

some food, when not too sour. But they are not, and this seems to me the reason—*they are too much diluted with water.*

The milk from cows fed too much, or too exclusively on slop, is too thin. The flesh of hogs, horses and cattle thus fed is too watery, and will waste away rapidly, spoil quickly, and the fat of such animals is too soft and oily.

Animals fed on slop exclusively become like inordinate beer-drinkers, bloated, watery and weak, from too much imbibed watery fluid, and the causes of diseased conditions are not as well resisted by them as they would be in a normal state. Slight bruises and scratches in these animals are cured with difficulty, owing to the weakened condition of the tissues. The foregoing facts should be kept in mind and positive directions given that slop should only be fed with a proper proportion of more solid food. Cows, especially, should have an excess of dry hay and other fodder, as a condition of health, if they are kept at all on "brewers' grains" or sugar meal.

Fed in this way, animals retain their health and keep in thriving condition, even when using a considerable preportion of the much-abused "distillery slops."

Respectfully submitted,

JAMES MACWHINNIE, V.S.

BUFFALO, N. Y.

EDITOR JOURNAL OF COMPARATIVE MEDICINE AND SURGERY:—

I would state in reply to Doctor Todd's communication, published in the last number of the JOURNAL, relating to the spinal paralysis of the young carnivora born in the St. Louis Zoölogical Garden, that the disease is one that superintendents of zoölogical gardens have most frequently to contend with. It is caused in many cases by the cubs not having sufficient mineral matter in the bone, and consequently the animal is not able to use its limbs, thereby causing paralysis. As soon as the young are able to eat meat, I administer phosphates with good results. During the period of gestation I feed the mother with bones of sheep or goat, as these are most easily digested.

The difficulty in distinguishing between the sexes of the spotted hyæna is owing to the fact that the flesh in front of the clitoris of the female hangs underneath the belly, presenting an appearance similar to the penis of the male; but the matter can be settled if the tail is raised, as the testicles of the male are then visible.

W. A. CONKLIN, PH. D.
Director Central Park Menagerie.

ANSWER TO CORRESPONDENT.—J. N. N. is informed that the term thoroughbred refers to a distinct breed of race horses, who trace their descent from the Arabian running horse, and the term is only applied to such. We cannot say a thoroughbred Clydesdale or Perchon, but simply pure bred Clydesdale. The term is not applied to horned cattle.

REVIEWS.

MANUAL OF HISTOLOGY. Edited and prepared by Thomas E. Satterthwaite, M.D., in association with Drs. Thomas Dwight, J. Collins Warren, Wm. F. Whitney, Clarence J. Blake, and C. H. Williams, of Boston; Dr. J. H. C. Simes, of Philadelphia; Dr. B. F. Westbrook, of Brooklyn; and Drs. E. C. Wendt, A. Mayer, R. W. Amidon, A. R. Robinson, W. R. Birdsall, D. B. Delavan, C. L. Dana, and W. H. Porter, of New York City. New York: William Wood & Co. 1881.

This practical treatise on a fundamental branch of medicine, the importance of which is becoming daily more and more recognized, reflects the highest credit upon the able editor and the large staff of collaborators. The distinguishing features of the work are the eminently practical manner in which the various topics relating to the minute structure of the body are dealt with. It would appear that the editor and most of the contributors are, and have been, engaged in teaching Histology to different classes of students. This has clearly enabled them to learn exactly what the student needs in order to become familiar with the microscopical appearance and complexion of the body. The fact that Comparative Histology is duly recognized throughout the body, makes it of additional value to the veterinarian and student of comparative medicine. We know of no better work on this subject in the English language, and we feel great pleasure in welcoming its appearance as a timely contribution from American Histologists to the fascinating study of minute anatomy.

THE JOURNAL OF THE AMERICAN AGRICULTURAL ASSOCIATION. J. H. REAL, Editor. 127 Water street, New York.

"All national wealth depends on an enlightened agriculture." We welcome the above quarterly with more than usual pleasure. Its purpose is to disseminate the best attainable information on the subject of most importance to the farmer. It is a handsomely printed pamphlet of 260 pages, well illustrated and filled with articles at once clear, practical and profound. The essay on "The Railroad and the Farmer," by G. Edward Atkinson, is

certainly an exceedingly valuable contribution. The railroad question has become of the utmost importance to the farmer of to-day, and Mr. Atkinson certainly presents the subject in a fair and favorable light for the consideration of the agricultural interest. Those who are fortunate enough to read Mr. Moulton's article on "Mountain Side Farm" will have new ideas of the degree of refinement and general excellence possible to farm life, as well as visions of the great importance of these elements to general agriculture as an art and as a science. Prof. Warder's article on "Agricultural Education in Bavaria" is full of thoughtful suggestions, as well as reflections on our own deficiencies in that department of instruction; "The Husbandry of the Ancients," by J. M. McBryde; "Agriculture in reland," by J. P. Sheldon; "Farmers and the Tariff," by Prof. Arthur L. Perry; "The Soil of the Blue-Grass Country," by W. E. Plumley; "Cotton Seed as Winter Feed," by J. H. Moore; "Preventable Losses," by Prof. I. P. Roberts; "The Need of Experiments," by Prof. J. P. Stelle; "Agriculture in the Tenth Census," by J. R. Dodge; "Seeds and Quality in Fruits," by Dr. E. L. Sturtevant; "Agricultural Instruction," by Byron D. Halsted; "Ripening of Wheat," by Prof. R. C. Kedzie; "The Railroad and the Farmer," by Edward Atkinson; and some comments on the last named article, by L. E. Chittenden. Some account is also given of the farm of the editor of the *Rural New-Yorker*. Our readers will perceive by this list of the articles in the volume the nature and character of its contents, several of which consist of papers read at the Cincinnati meeting of the Society for the Promotion of Agricultural Science. Space forbids a more extended notice of the contents of this volume. The contributors are all men of great intelligence, observation and practical experience. It is intended to issue it quarterly, at the modest price of $2 per year.

BOOKS AND PAMPHLETS RECEIVED.

TWELFTH ANNUAL REPORT OF THE MANHATTAN EYE AND EAR HOSPITAL NEW YORK. 12mo. pp. 48. 1 plate. New York: 1881.

CONTAGIOUS DISEASES OF DOMESTICATED ANIMALS. 8vo. pp. 391. Plates. Washington: 1881.

NINTH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION. 8vo. pp. 84. Savannah: 1881.

THE CHICAGO MEDICAL JOURNAL AND EXAMINER. Published by the Chicago Medical Press Association. Chicago: 1881.

THE ANNUAL ADDRESS; delivered before the American Academy of Medicine, at its sixth annual meeting in New York, September 20, 1881. By EDWARD T. CASWELL, A.M., M.D., of Providence, R. I. President of the Academy. 8vo. pp. 16. Philadelphia: 1881.

THE GALVANIC ACCUMULATOR; for storing dynamical electricity for cautery and illuminating purposes. By LOUIS ELSBERG, A.M., M.D. 8vo. pp. 13. Cuts. Reprint from the Transactions of the New York Academy of Medicine. New York: 1881.

THE AMERICAN NATURALIST; devoted to the natural sciences in their widest sense. Monthly. Philadelphia: 1881.

NATIONAL LIVE STOCK JOURNAL. Monthly. Chicago: 1881.

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PROGRESS OF VETERINARY SCIENCE.

Rabies, a Possible Cause and Probable Preventive.—This "possible cause." according to Dr. L. L. Dorr, lies in the mixing of breeds. Hydrophobia may exist in all dogs, but it never originates in any but mongrels. The destruction of mongrels might stamp out the disease, only, unfortunately, no one knows exactly what dogs are of pure breed and what not. The "probable preventive" is a visit of the bitten person to the Pacific coast. No person has ever died of hydrophobia in that region, so far as is known.—*Medical Record.*

Precautions against Hydrophobia.—The Prefecture of Police have caused to be placarded throughout Paris the following precautions, to be observed in the case of persons bitten by a dog supposed to be mad. They are the outcome of a special hygienic commission composed of the following gentlemen: MM. Chatin (President), Gaubaur, Léan Colin, Trélat and Dujardin-Beaumetz:

1st. The bitten part should be made to bleed as freely as possible. It should then be washed with water—a jet being preferably used if near by. If water be not at hand, any other harmless liquid may be substituted.

2d. Cauterization should now be resorted to, and among the best caustics are the sollowing: Vienna paste, butter of antimony, zinc chloride and iron perchloride.

3d. The success of cauterization entirely depends upon the promptness with which it is done; therefore it should be resorted to immediately after the bath, by a layman, if a doctor be not present.

4th. Cauterization by ammonia and the various alcohols are proven to be qnite inefficacious.

Antidote for Hog Cholera.—I will say that I have been manufacturing molasses for the past twenty years, and have never known of a hog dying with cholera while being fed on the waste from a sorghum factory, but have known cases where hogs, after beginning to take the disease, and after some of them had died, the remainder—though some of them sick—were entirely freed from the disease by eating the waste. My neighbors frequently haul away the waste and use it, and it has in every case had the same effect, not a hog dying after its use.—*Indiana Farmer.*

Food for Carrier Pigeons.—A distinguished Belgian pigeon fancier, whose birds have carried off some of the best prizes to be had, including the famous two thousand francs prize for a race between Rome and Brussels, gives the following as the best food for carrier pigeons. Some of the birds bred by this fancier are worth a thousand francs apiece: Wheat, maize, beans, dried peas, a little millet seed and some buckwheat, together with some old plaster mixed with salt. A change of food is as desirable for birds and animals as human beings; it is well to ring the changes upon the above-named edibles.

A Remarkable Mode of Zoölogical Distribution.—M. Méguin lately presented to the Société de Biologie a collection of fifteen leeches, of a species foreign to those found in France. They were adhering to the walls of the mouths of horses just returned from the Tunis campaign. They had been camping near Bizerte. All the brooks of Northern Africa contain that kind of leeches, called *hæmopis sanguisuga*, whose jaws are too weak to bite the skin, so that they enter into the animals' mouths when these come to drink, and cling to the mucous membrane. They may live in this situation for weeks, causing hæmorrhages, and even asphyxia, if they enter the larynx. But they die almost immediately when introduced into the stomach or rectum.—*Chicago Medical Journal and Examiner.*

The Effect of Long-continued Minute Doses of Mercury on Animals.—Schlesinger, in a prize essay, published in full in the *Archiv für Exp. Path.* (Bd. xiii., S. 352), gives the following conclusions:

Rabbits, and particularly dogs, bear without harm the continuance for a year of small doses of chloride of mercury and sodium. Compared with controlled animals, however, they show a certain increase in weight, while examination shows a surprising increase in the number of red blood copuscles. In spite of this, the urine of these animals shows no change in its ordinary constituents, and no sugar or albumen present at any time.

The animals killed after taking mercury during a shorter or longer period show no disease of any organ. They only show a large accumulation of fat in those localities where fat is usually found in dogs.

Flesh and Fat Producers.—The *American Agriculturist* makes up, from the published analyses of the most eminent agricultural chemists, the following table exhibiting the relative nutritive value of different feeds. It is said to correspond strictly with the experience of many noted English feeders:

	Flesh.	Fat.
Turnips	1	5
Rutabagas	1	7
Carrots	1	7
Mangels	2	8
Straw	3	16
Potatoes	2	17
Wheat and barley	12	67
Linseed	23	92
Hay (early cut)	8	50
Buckwheat	9	60
Rye	11	72
Oats	12	63
Corn	12	68
Linseed cake	28	56
Bran and coarse mill stuff	31	54
Decorticated cottonseed cake	41	77

It will be seen from the above that cottonseed meal has no superior as a flesh-former, and that for fattening it is better than every other article of stock feed. In a very short time it has established itself, both in this country and in Europe, as the food for beef cattle and for dairy purposes.

Pasteur's Vaccinations.—Statistics brought up to Oct. 1, show that the inoculations of splenic fever, according to Pasteur's method, were performed on 160 flocks, comprising 68,900 sheep, of which 33,576 were vaccinated and 21,938 left uninoculated, so as to judge of the results of the difference of treatment. Before vaccination, the losses caused by splenic fever amounted in the whole of the flocks, to 2,986 animals. During vaccination, and until its effects were perfected, 260 sheep out of the whole number of 33,576 perished. During the same period, the mortality rose to

366 out of the group of 21,938 which were not vaccinated. When the effects of vaccination were complete in the first group, the mortality from splenic fever fell to 5. This rate has persisted up to the present time; and the next statistical account will give, it is expected, the same satisfactory results as regards the groups of animals vaccinated and left unvaccinated.

A New Cure for Snake-Bites.—All who are or have been in danger from venomous snakes will be glad to hear of a new cure, which seems capable of very rapidly destroying the poison. An account of experiments by M. de Lacerda has recently been presented to the French Academy of Science by M. de Quatrefages, in which permanganate of potash has been hit upon and found perfectly successful as an antidote to serpent poison (derived from the Brazilian Bothrops), whether injected beneath the skin or into the veins of dogs. The solution of permanganate of potash, diluted to the extent of one to one hundred with distilled water, was injected, in one series of experiments, within a minute or two of the injection of the poison, and in no case did the ordinary consequences of the poison appear; while the venom at the same time was proved to be fully venomous by its action on other dogs without the administration of the antidote. In other cases, where the poison was injected into the veins of dogs, followed in half a minute by the antidote, its consequences were arrested; while a still more striking result was the cure of dogs when already very seriously suffering from the effects of the poison. In two or three minutes the worst consequences disappeared under the action of the permanganate, and the state of general prostration was recovered from in at most five-and-twenty minutes.—*Land and Water.*

Controlling Sex.—To those interested in knowing how to control the sex of offspring of animals, the following statement from Dr. George Watt, in the *National Live-Stock Journal*, may be of some use. These observations were carefully and faithfully made, and extended over a period of nearly fifty years. His conclusions are: "When first developed so as to be viable, the ovum of viviparous animals is male, and if vivified at this stage, the offspring is male; and at some period in its progressive development, before its viability is lost, it becomes female, and from conception at this stage the offspring is female. This is in accordance with 'Adam was first formed, then Eve;" and may it not be that creation is the precursor and type of procreation? At least we have many hints of harmony between the two. If this theory is true, when we wish to breed a male, the female should be mated at the earliest hour she will tolerate copulation. If female offspring is desired, mate as nearly as practicable to the close of the "heat" period.

A Breeding Mare Mule.—A breeding mare mule was recently exhibited at the Jardin d'Acclimatation in Paris, which has produced three colts. As the French *savants* have hitherto been very incredulous as to reports of mule breeding, it is stated that they carefully inquired into this case, and became satisfied that it was true. We have heard of mare mules occasionally breeding in America, but we do not recollect the year and locality of this, or whether the sire was a jack or a horse, and shall be obliged to any of our readers who can furnish these particulars; also, what sort of an animal the produce turned out to be. In the above instance of mule breeding in France the sire was a horse.

Protection of Cattle against Charbon.—M. Pasteur has addressed he following letter to the Prefect of the Seine et Marne, on the subject of the numerous demands addressed to him by various veterinary surgeons,

through the medium of the Couseil-Général, on the subject of the supply of the new vaccinal matter which he has introduced for the purpose of preventing black water or charbon. The demand for the vaccinal matter, it seems, now already far exceeds the available supply: "Monsieur le Préfet. —I was in London when you came to Paris to explain to me your desire of calling upon the Conseil-Général of Seine et Marne to set aside a grant for creating a small laboratory for furnishing my vaccinal matter by which to protect animals against charbon. I think that such a grant will be premature. Many questions of detail still remain to be solved, which can at present only be solved by me. For example, all the vaccine which has passed out of my laboratory for the last month has been obtained by recent culture. An arrangement such as you propose implies storing, and the employment of tubes prepared at long intervals. Difficulties which will, no doubt, be easy to remove by further research at present occur to impede the preservation of this vaccinal matter in tubes. Do not, however, fear a famine of this precious liquid for next year. This pest does not prevail to any considerable extent during the winter, and at present I already possess the means of making it on a large scale. I shall find, after the holidays are over, one or two hectolitres of culture fluids already prepared; and by the month of March or April, when vaccination may be most usefully commenced, there will be, I hope, vaccine prepared for a million of animals. A very intelligent person in my laboratory will have no other occupation during the whole of the year than the preparation of this vaccine, and will have an assistant. There will be a depot of vaccinal tubes here; and I shall hope to be able to place it in the hands of veterinarians at five centimes per beast, which is about what it costs. During the first year it will be necessary to watch the state of the preserved vaccine and the permanence of its protective powers. A provincial establishment would occupy me and take up my time as much as the supply laboratory which I shall arrange here. When the regularity of working of that which I am here arranging has been proved it will be time to follow out our plan, and you can then count on my readiness to serve you. I have the satisfaction to inform you that, thanks to the devotion of all assistant fellow-workers and laboratory servants, the number of animals already vaccinated reaches nearly 30,000 sheep and some hundreds of oxen, cows and horses."

HYDROPHOBIA AND ITS CURE —Among the many advances which the germ theory of disease is now making, few could be more interesting than that which would enable us to cope with the terrible malady, hydrophobia, justly dreaded from its fatality and nature; and already we are beginning to get a glimpse of a possible cure for the disease.

M. Pasteur, the pioneer and leader of this branch of practical medicine, found that it was possible to "cultivate" organism from the saliva of a boy who had died of hydrophobia, and that after this artificial cultivation, the organism injected into a rabbit produced a disease which, though rapidly fatal, differed in its symptoms from those of true hydrophobia. M. Galtier, taking up the inquiry and acting on a principle which has been found to hold good in another disease, viz, that the effects of a virus differ very considerably according as it is introduced into the veins, and thus into the circulation directly, or into the tissues under the skin, and so indirectly into the circulation, injected some hydrophobia virus into the veins of a number of sheep and goats. The effect was no inconven ence to, or symptoms of disease in, the animals, and further it was found that they were now rendered protected against the action of hydrophobic poison when received into

the body in the ordinary way, while other sheep and goats not protected in like manner, quickly succumbed. Further experiments are now being made by the same French veterinary surgeon to ascertain if this injection of virus into the veins has any effect on the development of the true hydrophobic poison communicated by the bites of animals. As is well known, the laten period of this disease—that is, the time which elapses from the reception of the poison till the manifestation of the symptoms—is considerable, and it has been conceived possible that the injection of hydrophobic virus into the vein, after it has been communicated by the bite of an animal, may produce a mild form of the disease, which will render the body, in a way that we cannot explain, incapable of serving as the place of the development of the true disease, and thus establish a cure. Whether experiments will confirm this or not it is premature to judge, but it may be added that in the case of small-pox, in cases where the disease has been already contracted, vaccination has no effect on it.

There is another remedy, which has of late years been tried for hydrophobia, and it is said in Germany with success—that is, the arrow poison of the South American Indians, known as urari, curari, or woorali. This substance has the effect of preventing motion by paralyzing the nerves which go to the muscles known as motor nerves, and as one of the worst symptoms of hydrophobia is interference with respiration by the respiratory muscles being spasmodically contracted, it seemed likely that this substance, by rendering the nerve less capable of conducting the impulses which placed the muscle in contraction, might be of use, and there are several cases in which this drug has been accredited with effecting a cure.

The Stomachs of the Horse, Cow, Sheep and Pig.—A. Stutzer (*Jour für Landwirthschaft*) has tested the comparative value of pepsin obtained from the stomachs of the above animals, and found that that from the pig is the most active.

Rapidity of Stomach Absorption in the Dog and Cat.—H. Tappeiner (*Zeitschr für Biol*) has determined the rapidity of absorption of various substances in the stomach of carnivora when the pylorus is tied. He fed the animals with definite amounts of food in solution. The result showed that very little absorption would take place under the conditions imposed. Secretion seemed to take place more rapidly than absorption, thus keeping the stomach full of fluid.

The Digestion of Fishes.—Rochet and Mourrut (*Compt. Rend.*, 90, 879–881) have made a number of experiments regarding the stomach digestion of various fishes of the genus *Scyllium* and *Lophia piscatorius*. They found that the activity of the pepsin obtained from gastric mucous membrane differed very much in different fishes. Four grains of the gastric mucous membrane of the scyllium digested six grains of fibrin in an hour. This was eighteen times as strong as a corresponding amount of the mucous membrane from a lophia.

The acidity of the gastric juice of fishes is very great, varying between six to fifteen grams (ʒ iss to ʒ iv) of hydrochloric acid litre (quart). This is somewhat greater than that of the human stomach, which is about one grain per litre.

On the whole, the fish gastric juice seems to resemble that of a dog.

Muscular Strength in the Jaw of the Crocodile and Dog.—MM. P. Regnard and R. Blanchard have made some experiments with crocodiles to determine the power of their masseters.

In one crocodile, ten feet long, weighing 115 pounds, the animal in closing his jaws developed a resistance equal to 1,400 pounds (700 kilos.) at the point of insertion of the masseter.

In a dog weighing 40 pounds a resistance of about 330 pounds was obtained.

The proportional strength of jaw to weight of animals is as follows: 1 pound of crocodile will bite with a power of 12 pounds; 1 pound of dog will bite with a power of 8 pounds.

Dog Disease in the Arctic Regions.—Dr. Colan writes, in the English *Veterinary Journal*, that the dogs in Greenland are subject to a kind of madness much resembling rabies, though differing from it in some marked particulars. It first appeared in 1859, and was supposed to have been communicated to the dogs by the foxes. It was exceedingly contagious between dog and dog, but no human being was affected with true hydrophobia from the bite of the dog. It was so severe that the Danish government had to take decisive measures to stamp it out. When an autopsy was made, no cause for the disease could be found, but there was a pitchy substance in the intestines, and ulceration for four inches on either side of the ileocœcal valve. The Doctor asks, "Is it not possible that the dog disease of the Arctic regions is but ripening rabies, which to the southward of 70° north, shows itself in the rabies, which cause hydrophobia? Or is it that hydrophobia is modified in passing through the bodies of carnivorous animals going north, such as foxes and wolves, and becomes the disease we see in North Greenland?" It is a well-known fact that when rabies first appeared in some countries it was less virulent than after a number of years; if so, might it not now be developing in Greenland?

Diseases Among Texas Cattle.—Dr. Jos. R. Smith, U.S.A., read a paper upon this subject at the American Public Health Association. He gives a table of the pathological changes observed in cattle which have died from Texas fever. His report concludes with some observations upon the question whether this disease is endemic. He says: "I think the facts here reported prove that the herds of Texas cattle, when grazing on their prairie pastures, are singularly free from disease—certainly from any disease recognizable by the ordinary tests of disease, viz.: symptoms and pathological appearances. If so many assertions had not heretofore been made, and so many witnesses heretofore cited, where Texas cattle, apparently healthy, had infected other cattle, mingling with them, crossing their line of march, or following them in their grazing grounds, the inference from the foregoing would be undoubted, that there was no danger to be apprehended to other cattle by exposure to cattle from Texas. Whether some of these instances do not deserve another interpretation, is in my mind a question. Certainly, in many of them, accounts of which I have perused, there is no such rigorous analysis of facts as shows the conclusions drawn to be inevitable.

From the fact that imported cattle from the North soon after arrival in this Southern clime sicken and die in great numbers, it cannot be logically concluded that such death results from infection from Texas cattle, and certainly in many instances of this kind not the slightest evidence is offered of any intermingling of imported and natives. On the contrary, as in the case quoted on page 244, Transactions American Public Health Association, 6 vol., it is stated by the owner of the Durham stock that sickness and death appeared among his newly imported Durhams before their arrival at and on the way to their home near Mason.

It is well known to importers of fine horses in this country that considerable risk attends their importation, and this when kept by themselves in cities and in private stables. Emigrants, too, aro subject to disease, not all of them, but a sufficient proportion to make the matter an element in considering the subject of emigration.

Now this sickness of newly-arrived men and horses has always been considered due to some acclimating process. The idea does not lack probability that the sickness and mortality among the imported cattle are due to a similar acclimating process.

RELATIVE DISTRIBUTION OF TRICHINÆ SPIRALIS IN THE MUSCLES OF THE HOG.—The following table, furnished by Dr. J. T. Payne in a report on trichinæ in Southern hogs, will be of value to veterinary inspectors. It shows the number of trichinæ found in one grain of each of the following named muscles:

	Pectoral.	Diaphragm.	Abdominal.	Ham.	Total.
Hog No. 1	.	9	.	.	9
Hog No. 2	4	9	2	3	18
Hog No. 3	31	74	65	218	388
Hog No. 4	262	120	105	188	675
Hog No. 5	.	20	22	.	44
Hog No. 6	12	.	22	.	34
Hog No. 7	60	76	152	4	222
Hog No. 8	98	52	166	136	442
Hog No. 9	.	8	3	.	11
Hog No. 10	181	294	119	92	686
Hog No. 11	39	118	79	22	258
Hog No. 12	.	120	17	260	397
Hog No. 13	27	83	13	29	152
Hog No. 14	14	64	21	33	132
Hog No. 15	19	40	37	16	112
Hog No. 16*	.	.	.	.	.
Hog No. 17	13	49	25	14	101
Hog No. 18	.	17	15	3	35
Hog No. 19	2	7	19	6	34
Hog No. 20	13	22	25	9	69
Hog No. 21	16	24	13	38	91
Hog No. 22	92	219	85	102	498
	885	1,815	1,003	1,173	4,386

* Not counted, but very highly infected with trichinæ.

From this it appears that the parasite is about equally distributed between the diaphragm, the abdominal muscles and the ham.

EXTRA-UTERINE PREGNANCY IN A QUAIL.—Dr. Lydston, of Chicago, describes the following in the *Medical Record*: "A tumor was discovered in dressing a quail. It was situated in the peritoneal cavity, and was apparently free from adhesions to the intestines and abdominal walls. It measured a fraction less than seven inches in circumference, and weighed two and a quarter ounces. On section, it presented a number of laminæ, composing the walls of a cyst, about as large as a small almond. The two internal layers appear to be distinct from those external to them, and separated from the latter by a layer of grumous material resembling the yolk of an egg after partial cooking. The cyst itself was empty. Microscopically, the laminæ composing the cyst walls presented irregularly inasculating fibres of connective tissue, and the grumous material above-mentioned, contained oil globules in abundance, amorphous and granular matter, and what strongly resembled tesselated epithelial cells, the outlines of which were not all clear. The external layer of the sac was rough and corrugated, and of a brownish color, the remaining layers being greenish

white. The tumor was evidently an abortive ovum, which failing to enter the oviduct, and falling into the peritoneal cavity, had become encysted by successive layers of fibrinous deposit. The causes of its failure to enter the oviduct was probably an occlusion of the latter, either from injury or inflammation. It presents a striking analogy to the process of encystment which occurs in extra-uterine pregnancy." Dr. Lydston had never heard of but one similar case, which had occurred in a domestic fowl.

THE TEMPERATURE OF CATTLE.—A few words in reference to the temperature observed in cattle:

Before beginning my study on this subject, my ideas of the temperature of cattle were quite vague, and the first reports received from Corpus Christi, where the average temperature appeared as over 103 degrees, staggered me.

Could their natural temperature be so much higher than that of the human body? But not only were the next reports confirmable to the first one, but *all* received were to the same effect, and the average temperature of forty-five cattle, as reported to me by five different observers, was 102.59 degrees.

I know of no observations made for the purpose of determining the normal temperature of these animals.

In looking over the volume of "Researches, Physiological and Anatomical," by John Davy, published in London, 1839, I found some experiments reported by him.

He states that the temperature of the blood of an ox flowing from the carotids was 100 degrees in summer, at Edinburgh, and that the temperature of an ox ascertained the same way in Kandy, May 28, was 102 degrees, the atmosphere at the same time being 80 degrees.

When further I saw the temperature of fever in these animals, as observed by Prof. Gamgee, given as from 106 to 110 degrees, I came to the conclusion that the normal temperature of cattle exceeds the human temperature four or five degrees.—*Dr. J. R. Smith, in Report to American Public Health Association.*

THE SIZE OF THE SPLEEN IN CATTLE.—The question of the size and appearance of the normal splenic spleen in cattle is of great importance, since that organ is so often affected in contagious diseases. Dr. Jos. R. Smith contributes the following facts upon this point. He says:

The mean of all my figures gives the weight of the spleen as exactly 2 lbs. The spleen of Texas cattle, weighed under the supervision of Dr. Rauch, in Chicago, gives an average weight of 2½ lbs., while those of the natives reported by Dr. Rauch (Illinois probably, or vicinity), average less than 1½ lbs. The ages of these cattle are not given.

Dr. Powell, at Fort Griffin, found that the weight of spleens increased regularly at different ages up to five. The figures deduced from all my reports agree with this. The average weight of spleen, classed according to the age of animals, was as follows:

In animals aged two years, 1.68 lbs. In three-year animals, 2.18 lbs. In animals aged 4 years, 2.45 lbs. In five-year animals, 2.85 lbs.

If the animals reported in Chicago were three, four and five years old, according to the weights just given for those ages, the weight of the spleen should have averaged 2½ lbs.

The spleen farther appears, according to my observations, to vary with the weight of the animal generally. From Fort Ringgold, Texas, I have

quite full data from seventy-four animals killed for beef, and I take this place because every animal reported from there is fully reported.

Of all these beeves the average net weight was	301 lbs.
Of 38, the weight of whose spleens was between 1 and 2 lbs., average weight was	267 lbs.
Of 27, the weight of whose spleens was between 2 and 3 lbs. .	346 lbs.
Of 9, the weight of whose spleens was between—and 3 lbs. .	312 lbs.

Before inferring, then, from the weight of spleens as to the health or disease of the animal, it certainly may be demanded that the weight and age of the suspected animal also be given. There is abundant reason from the figures and statements of this report to believe that the spleens of cows in this climate are heavier and larger than those of Northern cattle. The average weight of all the spleens here reported was 1.98 pounds (almost exactly 2 pounds), and the reports are from all over the State. There is no part of the State where there is less reason to believe that disease exists among the cattle than in the vicinity of Forts McKavett or Mason; yet in Dr. Waters' report from there he says that "only three or four (spleens) weighed as low as 1½ lbs." In numerous cases where the spleen weighed 2½ lbs. and upwards, the observer has distinctly said that all the other organs seemed healthy, or that the animal appeared in good health. Our knowledge of the functions of the spleen is still quite imperfect. The numerous observations of Dr. Rauch, that where the spleen was of unusual size, the liver varied inversely—being unusually small—would at least give ground for suspicion that in these cases the functions of the two organs might be complementary.

Certainly the Darwinian can see no difficulties in the conclusion that a 2 lb. spleen may be a normal organ in Texas, and a 1½ lb. spleen a normal organ in Illinois.

Action of Light and Darkness, and of Different Colored Lights upon the Respiration of Lower Animals.—Jac. Moleschott and S. Fubini (*unters z. natural, d. menschen u. d. Thi re,*) have made some extended experiments which show the marked influence of light upon the excretion of carbonic acid gas. The facts obtained have an important bearing upon hygiene. The experiments were made with frogs, birds, rabbits, dogs, guinea-pigs, and water-rats. These animals were put in an apparatus in which the amount of $C.O._2$ exhaled per hour could be measured. The apparatus was so arranged, that the animals could be kept in the dark or in various colored lights. The authors give the following table showing the average variations in the excretion of carbonic acid gas in darkness and light, when the animal is blinded and when it is not:—

CLASS OF ANIMALS.	ANIMAL UNINJURED.		ANIMAL BLINDED.	
	In Darkness.	In Light.	In Darkness.	In Light.
Amphibious	100	125	100	111
Birds	100	134	100	127
Mammals	100	140	100	112

This shows that light has an undoubted influence in promoting the excretion of $C.O._2$; also, that this influence is not due to any effect of the light upon the eyes. Other experiments showed that it is rather due to the effect of light on the skin.

The authors also found that light increased the activity of tissue respiration. Thus the muscles of a dog, in light, give off .408 grams (gr. vii.) of $C.O._2$; in the dark, only .231 grams (gr. iv.).

Different colored lights affect the $C.O._2$ excretion. Red light has a very

weak action. But violet-blue and white lights have a powerful effect as respiratory stimulants.

The authors conclude that light has a very powerful effect upon the tissue changes of all the animals which they experimented upon (insects, amphibia, birds and animals).

CHLORAL V. STRYCHNIA.—The following facts may be of some interest to your readers. On May 25th, I found a pet fox terrier bitch suffering from severe symptoms of strychnia poisoning. There were well-marked risus sardonicus and opisthotonos, with much rigidity of the limbs. She was lying on her side, totally unable to get up, and the respiration was 90 to the minute. I gave her immediately a draught of bromide of potassium and chloral (thirty grains of each), but owing to the spasmodic movements of the head I failed to get it all down. I then gave her sixty grains of chloral (in crystals) on the tongue, and held her mouth until it was dissolved. She gradually went to sleep, and three hours after was able to walk, although with a good deal of weakness about the hind legs, and she has since gone on slowly to recover.—*London Lancet.*

CONTAGIOUS PYÆMIA OF RABBITS.—In some experiments on the inoculation of rabbits with the blood of animals dying from splenic fever, Professor Semmer, of Dorpat, has found that a disease is produced which is not anthrax nor ordinary septicæmia, but a form of pyæmia, which he believes to be new and specific. The animal inoculated with the blood of splenic fever died in two days with abscesses over the glutei at the place of inoculation, and ecchymosis and infarets in internal organs. The blood was not decomposed, but presented an excess of white corpuscles, while the red corpuscles were beset with micrococci, which were found also in the serum of the blood and in the pus of the abscesses. A second rabbit, inoculated from the first, died in six days with very similar appearances, and micrococci were found also in the cells of the liver and in the tubules of the kidney. White points were also found in the liver, due to the accumulation there of colorless corpuscles. A long series of inoculations gave very similar results. An inoculated dog died on the third day with purulent conjunctivitis and a low form of pneumonia. The liver and kidneys were yellowish-brown, the liver cells granular. In the renal tubules there were detritus and fat-glanules, and colorless blood corpuscles in the glomeruli. At the place of inoculation pus had formed, which contained the same micrococci. Central experiments with ordinary pus yielded a negative result. The destruction of the pathological condition from ordinary contagious septicæmia is in the absence of any destruction of the blood corpuscles, the absence of transudation and inhibition, and of any rapid decomposition after death. The small micrococci appear to be the agents of its production. In many cases, there is no evidence of metastasis and infraction, which do not, therefore, appear to be an essential part of the morbid process.—*London Lancet.*

TRICHINA-LIKE PARASITES.—To microscopists who are endeavoring to ascertain the various habitats of trichinæ, a useful word of warning has been given by M. Mégnin in a paper read before the Societè de Biologie, in which he points out that many minute encysted worms are met with which are not trichinæ, although so clearly resembling them as to have deceived many observers. The supposed discovery of trichinæ in the rootlets of beetroot, proved to be a mistake by Virchow and Kuhn, is a striking instance

of this sort. Lagenbeck discribed trichinæ in the intestines of earth-worms; but Kuhn showed that the parasite is quite distinct from the trichina sprialis. Merlan and Tigri thought they had found trichinæ in the lungs of sheep; but Deepech showed that these were merely the embryos of strongylus filaria. Cobbold has stated that the trichinæ is common in the hedgehog. Mégnin is convinced that this is an error, and that the worms described are merely the encysted larvæ of the spiroptera clausa. He showed preparations of an encysted nematoid worm, which might easily be mistaken for the trichina; but pointed out that the former differs in having a papilla at its mouth, and the anus is not terminal. Siebold described as a trichina a worm found in cysts in the peritoneum of the grey lizard and other creatures; but Mégnin asserts that this also is the larva of a spiroptera (S. abbreviata), the adult individuals of which are abundant in the intestines of the same animal. An encysted spiroptera still more strikingly resembling the trichina has been found in the muscles of the frog. Very similar, but larger, encysted worms of the same genus have also been discovered in the subcutaneous tissues of a bird (the manchetes pugnax).—*London Lancet.*

A New Mode of Treatment with Chloroform.—In an important paper relating to the use of anæsthetics communicated to the Paris Academy of Science by M. Paul Bert, the new French Minister of Public Instruction, experiments are described in which dogs, mice and sparrows were kept in chambers containing air along with various proportions of some anæsthetic. In a graduated series of such mixtures of increasing strength one is found just sufficient to cause insensibility, and proceeding higher a dose is reached which kills. The interval between these points (the anæsthetic dose and the fatal dose) M. Bert calls the working zone (*zone maniable*). He has sought to determine it for various agents—chloroform, ether, amylene, bromide of ethyl, chloride of ethyl—for the animals named, and has reached the singular result that in all these cases the fatal dose is precisely double the anæsthetic dose. Thus—*e. g.*, in the case of mice submitted to chloroform, six grammes of chloroform vapor in one hundred litres of air causes insensibility, and twelve grammes is fatal. When an animal is made to breathe, in the way indicated, a mixture about the middle of the working zone, it is very quickly anæsthetized, and remains perfectly quiet during the whole experiment (two hours in some cases), not requiring any attention or concern; and the contrast in this respect to the ordinary methods by compress, sponge, etc., is striking. In the latter case, indeed (M. Bert points out), a patient alternately breathes, according to the quantity of chloroform in the compress or its distance from mouth to nose, a mixture of air and chloroform, either below the active dose or within the working zone, or at or beyond the limit of safety; and a fatal result in the last instance is not always warded off by prompt removal of the compress. The working zone is often very narrow; in the case of chloroform, while eight grammes in 100 litres does not suffice to render a dog insensible, twenty grammes kills it. Ether is much less dangerous, for between the active and the fatal doses of it there is an interval of forty grammes. An anæsthetic acts, not by the quantity respired, but according to its proportion in the inspired air; hence the statements of surgeons as to how much chloroform they put on the compress have little value. M. Bert recommends the use of a mask, communicating by a tube, with a zinc reservoir holding 200 or 300 litres of the anæsthetic mixture. The pulse and the respiration need no attention. The

most delicate matter would be the determination of the lower limiting dose. The author's experiments here give no guidance. The doses varied greatly for dog, mouse, and sparrow—always less for the mouse than the dog. They were always greater for the sparrow than for the mouse; and in the case of chloroform and amylene they were about equal for the sparrow and the dog. Among other facts, it is stated that the mixture alters very little in strength, except in the first instants. Experimenters have sometimes been mistaken as to the fatal proportion of chloroform in air, through using potash to absorb carbonic acid; this substance rapidly decomposes chloroform. Once more, the working zone for protozide of nitrogen is more extensive than for the substances specified; the ratio between the limiting doses being one to three.

NEWS AND MISCELLANY.

Death of Four Horses from Eating Ensilage.—We have just been informed of the death of four horses which had been kept for about two months on a diet of ensilage. They belonged to a gentleman living in Woodstock, Vt. He began to feed them in November, 1881, giving about half a bushel of ensilage, with a little hay, three times a day. The animals died in January, with symptoms of dropsy.

The Number of Cattle reported in Texas for 1881, is 4,464,000 head, valued at $39,640,320.

The Number of Goats in Europe is stated to be 17,198,587, those in Denmark not being counted, as the goats there had not been reported when the census was made up. Greece possesses the largest number in proportion to her population—there being 1,339,538.

Tuberculosis has been found by M. Toussaint to become more powerful and rapid in its action the oftener it is inoculated.

Elephant "Bolivar," 9 feet 6 inches high, sold at the Van Amburgh sale for $7,100.

The Hog Products of last year in the United States aggregated 33,000,000, of which number 7,000,000 were handled at the Union stock yards, Chicago.

Fasting Dog.—A dog which had been accidentally confined at Metz, fasted 39 days, before he was released, and recovered.

M. Richenbach, in noticing the statement that Dr. E. C. Spitzka found in the egg of a turtle a live magot, says he once found in a hen's egg a small piece of printed paper.

Three Hundred Horses Burned.—The Fourth Avenue horse-car stables in New York City were destroyed by fire on the night of October 11th, and about 300 horses were burned to death.

Poison in Lupins.—It seems that there is a poison in lupins which produces in sheep a disease closely resembling jaundice. The virus can be neutralized, on the authority of Dr. G. Liebacher and Prof. Kuhn, by resorting to steaming.

Recipe for Sheep Dip Used in Texas.—
30 pounds of lime,
30 pounds of sulphur,
14 pounds concentrated lye,
15 gallons of water for the solution,
1 gallon solution to 12 gallons water.
The use of this dip is said in many cases to cure the scab, but it is questionable whether it will not damage the fibre and growth of wool. In this latitude tobacco dip has given the best satisfaction in all respects.

Sheep Scab in Australia.—It is said the Australians have a very stringent law for the eradication of scab in sheep. They have the State Scab Inspectors, whose business it is to see that the law is enforced. Every sheep owner who discovers indications of scab in his flock is obliged to notify all flock masters within a certain radius of the fact, and also to post notices in public places. If the disease is not stamped out within ninety days the diseased animals must be killed. The result has been that scab has almost disappeared from Australian flocks.

Margosse Oil.—Sir Samuel Baker, in his "Rifle and Hound in Ceylon," mentions this oil as being a most valuable balsam for wounds, its peculiar smell, which is even more offensive than assafœtida, preventing the attacks of flies, which otherwise would blow the sore and occasion a nest of maggots in a few hours. It has also great healing properties, and soon creates a healthy appearance in a bad cut. It is manufactured from the fruit of a plant in Ceylon, but Sir Samuel Baker has never seen it in the possession of an English medical man.

M. Pasteur has been elected a member of the French Academy.

Thomas C. Cowley, V.S., who graduated last March, died in St. Louis.

Oil Cake must not be fed to cows alone. For cows that are dry, feed two pounds of oil cake with four to six pounds of corn meal per day. Avoid sameness in diet. Corn meal alone is likely to put the cow's system into a feverish condition.

Consul-General Weaver writes from Vienna, Austria, to the Secretary of State at Washington, that rinderpest has broken out in an epidemic form in the province of Lower Austria, and has resulted in a loss from the disease, and by the destruction of animals—cattle, sheep and goats—supposed to be infected, of 3,088 head.

White Horses.—The horse has always been one of the most sacred animals among peoples of the Aryan race. Even in the old Hindu poems the sacrifice of a horse constitutes the most important ceremony in the primitive Aryan religion. The *Cornhill* reminds us that the Germans of the time of Tacitus kept White horses in their temple enclosures at the public expense, and took auguries from their snortings and neighings. The horse was buried by the dead warrior's side, and in military funerals still accompanies his master's body to the grave. But it was among the Low Dutch and early English tribes near the old mouths of the Rhine and Elbe that this animal was held especially sacred. A white horse rampant is still the cognizance of Hanover and Brunswick. When the Saxons, Angles and Jutes invaded England they brought with them their emblem of the white horse, which subsequently became the ensign of Kent, the first of the Anglo-Saxon kingdoms. The leaders of this first contingent of invaders, whether real or mythical, were Hengist, that is, stallion, and Horsa, that is, mare. Hence, too, the frequent occurrence of the word horse in places associated with the Anglo-Saxon conquest, as in the case of Horsham, Horsley, Horstead, Horstead Keynes, while the progress inland of the West Saxons would seem to be marked by the white horse cut in the chalk downs of Wantage and Westbury. The final victory of Egbert over the West Welch or Cornish was gained at Hengestesdun, that is Horsdown—now Hingst n—in Cornwall. When, too, the missionaries first arrived in the island, the eating of horseflesh was made the test of adherence to English heathendom, while even in these matter-of-fact days a horse-shoe is by many regarded as a lucky object.—*Land and Water.*

One Cause of Colic in Horses.—Colic in horses is often brought on by feeding hay passed through the corn-stalk cutter, mixed with meal, middlings, or bran, and then wet up. The horse eats this food, thus prepared, so rapidly, that it is not properly masticated, and consequently becomes so clied in the stomach as to cause indigestion, followed by colic; more especially if directly after eating he is allowed to drink heartily of water; and the colder this is, so much the more liable to bring on colic. The best way, when a horse is brought into the stable, is to let him stand a short time, particularly if sweating, then give him three or four quarts of water, not over cold; then some uncut hay; after this a feed of grain or meal; and half an hour or so after that is eaten, all the water he pleases to drink. Some horses will eat cut hay with impunity, others cannot, or at least not till after they have first eaten some uncut.—*Live Stock Journal.*

A New Veterinary School.—In connection with the Minnesota College Hospital there is to be attached a veterinary school, where students will receive a full course of instruction in the different branches of veterinary medicine and surgery, extending over three winter sessions, of six months each. The faculty are to consist of Richard Price, V.S., F. W. McLellan, V.S., of St. Paul; H. J. Burnash, M.D., S.R.C.P., and C. C. Lyford, M.D., V.S.

An English Buyer of Horses in the United States.—A Mr. Fowler, the agent of a large omnibus company in England, is now among us for the purpose of making purchases. We should think the half-bred horses got by the large class of stallions, like the Percheron-Normans, Clydesdales, and others, out of common mares, would suit him best for this purpose, if they have good, tough, sound feet and legs. These are very essential, as the horses are to be used on paved streets and hard macadam roads entirely. None but the best of feet can stand the wear and tear of such, and, in fact, they are very important even for softer country roads, as the grit and gravel which abounds more or less in them, are quite wearing to the hoof; and then weak legs are more likely to be sprained on these than on harder roads, as, on account of the mud holes, extra hard pulling is often required. —*Live Stock Journal.*

Public Health Association.—The ninth annual session of the American Public Health Association met at Savannah, Ga., on the 29th of November. There was a large attendance. The meeting was called to order by the President, Dr. Charles B. White. The following papers were read at the morning session: "The Contagious Diseases of Domestic Animals," by Dr. Ezra M. Hunt, of New Jersey; "Diseases among Texas Cattle," a continuation of the report made to the association at the New Orleans meeting, December, 1880, by Dr. J. R. Smith, United States Army; "A Report of the Examination of Hogs at the New Orleans Abattoir During the Summer of 1881," submitted by the New Orleans Sanitary Auxiliary Association; "Trichinæ Spiralis," by Dr. J. M. Partridge, of Indiana; "Trichinæ Spiralis in American and German Hogs," by Dr. F. S. Billings, veterinary surgeon, of Massachusetts.

Horses Finding Their Way Home.—When going down to Melbourne last year, I left my two horses at a station 300 miles from here. I got them the day I got back there, but the next morning they could not be found, nor could they be found after two days' hunting. I made up my mind they had been stolen out of the paddock. I therefore bought two others to

bring me on here (Currawella). I was much surprised, a few weeks ago, to find they had come back the 300 miles themselves, and were running with their own mob on the run. I can any time lend a horse to be taken away fifty miles, and if he is let go he will be back in a couple of days. I once had two horses get away from me in the night, and, although close-hobbled, they went forty-five miles before overtaken.—*Field.*

The Consumption of Horseflesh in Germany is growing. A very careful supervision is exercised over the trade in Berlin. The inspector has a list of the stables where the existence of any contagious disease has been reported, and if he finds that the animal brought before him comes from any of these, a prosecution against the seller is at once instituted. Should the horse be found by the veterinary surgeons to be suffering from any disease not contagious, it is at once killed; but the body is sent to the Zoölogical Gardens. The Berlin butcher pays about $10.50 for a piece of horseflesh weighing from 250 to 300 pounds, but he retails it at 10 cents a pound for the filet, 6¼ cents per pound for the other pieces, and 5 cents for parts only fit to be made into sausages; and as horseflesh is naturally very dry, a good deal of it can be only utilized by being mixed with lard and converted into sausages, which, it may be added, are, it is shrewdly suspected, largely consumed by persons who are little aware of what they are eating. In one or two other German towns the consumption of horseflesh is, in proportion to their population, even larger than in Berlin. In Breslau, for instance, a town with 250,000 inhabitants, 2,000 horses are killed annually for the market; and in Altona, with a population of 100,000, the number reaches 1,500. In the western provinces, on the other hand, horseflesh is more rarely eaten even in the more densely peopled towns—the average number of horses killed annually in Dortmund being only 240, and in Bielefield about 100.—*World.*

Advance in the Price of Horses.—The Boston *Advertiser* says that there is a sharp demand for good horses at an advance of from fifteen to thirty per cent. on the values current the past two years. In fact, at no time within twenty years has there been so noticeable a scarcity of thoroughly sound stock. The horse car companies, that three years ago were supplying their wants at from $82 to $100, are now forced to bid up to $130 for animals counterparts of their 1879 purchases. Truckmen, who were last autumn buying heavy draught teams at $350 to $400, are now compelled to pay $425 to $550 for duplicates for these pairs. The most persistent demand is for dark-colored, well-bred carriage horses, in closely-matched pairs, each horse weighing about twelve to thirteen hundred pounds. Such a well-broken and stylish team, though not fleet, will secure from $600 to a $1,000, the price advancing from the lower range upon their freedom from blemish and their evenness in speeding. The major part of the receipts of horses are from Ohio.

Japanese Food.—M. T. Van Buren, our Consul-General at Japan, presents in a Blue Book some interesting facts in regard to the food of the Japanese people. With a population of 30,000,000, there is to be found in the whole country but little more than 1,000,000 head of cattle. Of these only 600,000 can be considered as fit for food. Therefore there are but two head of cattle for each 100 people, whereas in the United States we have for 100 mouths 73 cattle to fill them. Japan slaughters, however, 36,000 head of cattle, more than one-half of which is eaten by the foreign population, the rest being consumed by the Japanese navy and army. Mutton and pork

are, outside of the treaty ports, almost unknown. Fish enters largely into the food of the people. Mr. Van Buren mentions that "cod, salmon, herring, mackerel, salmon trout, carp, eels, skate, mullet, cat-fish, and plaice are plentiful and cheap." It is known that the Government has taken active measures in regard to fish-culture, and endeavors in every way to increase the products of the sea, sending for all American publications on these topics. The Consul states that "one-half of the people eat fish every day, one-quarter two or three times a week, and the balance perhaps once or twice a month." It is their habit to eat a great many varieties of fish raw. But the Japanese are more essentially vegetarians than even the Chinese, and all the land and marine plants, with the tubers, seem to be placed under contribution. Among exceptional food plants, Mr. Van Buren mentions an acorn which grows on a small bush from three to four feet high, "it has less sugar than the nut from the chestnut tree of America, but has the merit of being free from astringent and bitter qualities. Large quantities of these nuts are gathered, dried, and eaten by the people in various ways." This edible acorn would be worthy of introduction into this country.

Influences of Parents.—Mr. Howard lays down the following as "cardinal points" in the art of breeding:

1. That from the male parent are mainly derived the external structure, configuration and outward characteristics, the locomotive peculiarities inclusive.
2. From the female parent are derived the internal structure, the vital organs and, in a much greater proportion than from the male, the constitution, temper and habits.
3. That the purer the race of the parent, the more certainty there is of its transmitting its qualities to the offspring. Say two animals are mated; if one is of purer descent than the other, he or she will exercise the most influence in stamping the character of the progeny, particularly if the greater purity is on the side of the male.
4. That, *apart from certain disturbing influences or causes*, the male, if of pure race and descended from a stock of uniform color, stamps the color of the offspring.
5. That the influence of the first male is not unfrequently protracted beyond the birth of the offspring of which he is the parent, and his mark is left upon subsequent progeny.
6. That the transmission of diseases of the vital organs is more certain if on the side of the female, and diseases of the joints if on the side of the male parent.—*Country Gentleman.*

Cattle Restaurants.—Mr. Alfred D. Tingley, of the Humane Live Stock Express Company, 2 Wall street, has invented a scheme which he thinks will put a stop to the present inhuman system of sending cattle long distances without food or water, and slaughtering them while in the unfit condition caused by this treatment. Formerly he invented a feed car, which was tried, but was not a success. The grain and water were placed on the roof, and passed down by pipes when required; but the troughs in the crowded cattle cars got dirty, and the animals refused to eat out of them. An attempt was then made to substitute cars with compartments, so as to keep the cattle separate, but this rendered the cars unfit for any other purpose on the return trip, and was abandoned.

Mr. Tingley's present scheme is a simple one. It is to establish a number of "cattle restaurants" along each line of railroad that transports live stock. They will be 200 miles apart, and the cattle can be fed and watered

every twelve hours. When a train with a load of cattle on board gets within twenty miles of one of these restaurants a telegram will be sent to the officer in charge, and when the train arrives everything will be in readiness. Great iron cups, about as large as, and something of the shape of, a good-sized kitchen-pot, will contain food and water, run into them through rubber pipes from tanks above. The train will stop between two rows of these troughs, those on one side containing water, and those on the other side holding four quarts of food, consisting of a mixture of ground corn, oats and cut hay. Each car will have sixteen openings on each side, all of which can be easily closed when the car, which need be nothing more than an ordinary cattle car, such as is at present used, is required for other purposes on the return trip. Into each of these openings a trough with food or water will be pushed by means of a sliding bar upon which it rests. It will move forward to the car direct, or sideways, as may be required to reach the opening, the side motion being accomplished by sliding it along another bar, extending the whole length of the restaurant, the bar by which it is pushed forward accompanying. The flexible rubber tubes through which the food and water passes will, of course, offer no resistance. Mr. Tingley has in his office a model of a restaurant.—*Sun.*

The Claims of Comparative Pathology.—Veterinary Surgery has recently assumed a much more dignified position in the popular regard, and in the opinion of the medical profession. It has medical journals, some of which are creditable in spirit and contents, and in one or two of the medical schools it seems to be looming up as a branch of some importance in the future. It is rumored that a veterinary college is about to be started in St. Louis, and another under the auspices of an old established medical institution in Philadelphia. A course of lectures on Comparative Pathology is also to be delivered before the medical department of Yale College. A good education in this direction seems to be a great desideratum, for quackery in the field of veterinary science has been too long an unchecked evil, for which we presume no absolute remedy has yet been offered. While the tendency of the times is to expose illegitimate medical practice, and to restrain the abuses which have hitherto characterized it, little or nothing has been done, legally, for the protection of domestic animals, and in this protection to preserve the valuable property of many thousands of the people. There are many pretenders in the ranks of these practitioners, who have no claim whatever to be considered veterinary surgeons, and the sooner they are exposed the better for the reputation of all existing members of that fraternity who have been properly trained and educated in the study of the anatomy, pathology and therapeutics of the lower animals. A veterinary surgeon, as self-styled, in Chicago, recently ordered four ounces of tincture of aconite root from a pharmacist, whose curiosity led him to ascertain the fact that the prescriber believed that tincture of aconite root and sweet spirits of nitre were one and the same thing. If examination and graduation in this branch were obligatory on all those who intended to practice it, such ignorance would be scarcely possible.—*College and Clinical Record.*

The Practical Value of Vivisection.—Dr. Urban Pritchard writes to the London *Times*, under date of November 4:

"I see by the *Times* of to-day that a summons has been granted against my friend and colleague, Prof. Ferrier, for certain experiments on animals which were undertaken for the advancement of our knowledge of the functions of the brain.

"I do not wish to discuss the merits of the case, which, no doubt, will

be carefully considered and impartially dealt with; but I am anxious to add my testimony, however insignificant, to the practical value of Dr. Ferrier's work in my limited branch of medicine. On many occasions I have been considerably assisted both in diagnosis and treatment of nerve deafness by Prof. Ferrier's knowledge gained in the course of his experimental studies.

"Of course his work is, and will be, of far greater value to the general physician. I am confident that the medical profession at large feel so strongly on this point that Dr. Ferrier will not be allowed to bear any pecuniary loss should this case, through some technical omission on his part, be decided against him.

"I cannot help lamenting the harm that is being done to the advancement of the healing art by false sentiment fostered by many real well-meaning persons. Is it not sad to think that a professor should be driven to the Continent to perform experiments which have for their object the perfecting of a system which has already saved thousands of lives? And yet it is a fact that such did occur last year to another eminent London professor."

A WONDERFUL BIRD.—There is now in the London Zoölogical Gardens a remarkable bird, the Nestor Notabilis, or mountain Kea, of New Zealand. It is a parrot of strong frame and powerful bill and claws, which were used like those of all parrots for obtaining a vegetable diet, until the colonists introduced sheep and pigs. As soon as this was done the Kea seems to have abandoned vegetable food, and to have taken entirely to flesh eating. He attacks sick or disabled sheep, and with his powerful cutting beak opens a passage through the back, and eats the intestines. Even healthy animals are sometimes assailed by the Nestor Notabilis, and there are sheep runs in New Zealand where considerable losses have been incurred through these strangely degenerated birds. The specimen in the Zoölogical Gardens gave as much trouble to capture as an eagle, tearing the clothes of the shepherd who knocked it down while pouncing on a lamb, and lacerating his hands. The Kea scorns cooked meat, biscuits, fruit or seeds, and likes raw mutton better than any food. He will tear the skin and flesh from a sheep's head after the furious fashion of a vulture, leaving nothing but the bare skull. He at one time holds the morsels in his lifted claw, after the style of parrots, and at another grips them under his feet while rending with his beak like a hawk.

MEAT FROM CATTLE SUFFERING FROM SPLENIC FEVER.—At Birkenhead Police Court on October 6th a wholesale butcher of Liverpool was fined £5 and costs for having exposed for sale the carcase of a bullock which had been condemned as unfit for human food. The animal was one of a cargo of cattle from Boston, some of which died on the voyage from splenic fever. The inspector found the visceral evidences of this disease in this case, and condemned the meat, but it was conveyed to Liverpool and there sold. The evidence given was of a most conflicting character. The Birkenhead authorities, including Dr. Vacher, the medical officer of health, deposed to the flesh of animals dying of splenic fever being unfit for food; but the Liverpool inspectors and a number of butchers gave contrary evidence, many of the latter stating that the beef was "splendid," whilst Mr. Luya, the chief meat inspector, asserted, in cross-examination, that "he had only condemned one beast for splenic fever. He had seen several cases, but the meat was sold. Splenic fever came from America. As a usual thing he would not condemn a beast for splenic fever unless it was a very bad case. He did not

think the meat of a beast which suffered from splenic fever was injurious to health." We are glad the magistrate was not to be dissuaded by such evidence from deciding against the salesman, for although "thorough cooking" *may* suffice to render the meat inocuous, the risks of inoculation during the dressing of the meat are quite sufficient to justify its condemnation. *London Lancet.*

Australian Wild Horses.—It is claimed for the enormous island continent which lies at the Antipodes that ere long it will be the greatest horse-producing centre in the world. The Australian colonies already possess a larger number of horses in proportion to human beings than any other country in existence; and so favorable is the climate and pasturage for raising live stock of all kinds that it will not surprise us if, following the example of the United States, Australia should send us some great race-horses to run for our best English stakes, and perhaps to win the Derby, before many years have passed.

Speaking summarily, there are about 1,000,000 tame horses in the Australian colonies, to which must be added a ragged lot of about 120,000 wild horses, which hang upon the skirts of civilization, and are as great a nuisance to the squatters as rabbits to the agricultural community. The wild horses, or "brumbies," as they are called, owe their existence to a few tame animals which have from time to time escaped from man's control and taken shelter in the bush, where they have multiplied with inconceivable rapidity. In his "Physical History of the Human Race," Dr. Prichard tells us that the most refined, cultivated and polished of men—a Sir Charles Grandison, for instance—would utterly lose his civilization and revert to a barbaric type, if confined for a year upon an island solely inhabited by savages. Something of the same kind takes place where a thoroughbred entire horse escapes into the Australian bush. He cannot lose his fine symmetry, his high courage and eye of fire, or his grand action; but his coat soon becomes as coarse and rough as that of the wild colts and mares by which he is surrounded, and his progeny conform to the straight-shouldered, cat-hammed, and spindle-shanked type of their villanous dams. But such is the inborn partiality of the noble animal for liberty, that there is no instance known in which a runaway from civilization has returned voluntarily to slavery, although it might be imagined that man's care is more than sufficient compensation to a horse for the reasonable amount of work exacted from him. Nor, to all appearances, is wild life in the bush so attractive as to justify the preference shown for it by horses which have once served man as domestic animals. The pasturage is often very scarce, and in years of drought the rivers, brooks and water holes dry up, so that the "brumbies" have to travel hundreds of miles to get food and drink. Man's hand is against them wherever they go, and they end by becoming as unapproachable as the mountain sheep of North America, or the wild ass of Africa. In one respect they do not altogether lose their domestic instincts; for it is their habit to hover continually on the outskirts of civilization, partly from a desire to tempt tame animals to follow their runaway example, and partly because they know that where man dwells forage will not be wanting.—*London Field.*

Exports and Imports from the Port of New York Last Year.—The exports of live stock and fresh meats from this port during the year ending Nov. 30, 1881, aggregate in value $10,533,809, more than one-half of which sum is represented by fresh beef. Horned cattle, 39,968 in number, come next in point of value, being worth $3,934,865—nearly $100 each.

We sent away 26,441 sheep, valued at $317,794; 873 horses, worth $235,190; 1,668 mules, valued at $201,160, and 3,782 hogs, valued at $44,002; 1,706,-164 pounds of fresh mutton, worth $132,287. The quantity of fresh beef exported was 60,211,653 pounds, and its value was $5,688,511. In live cattle, the falling off, as compared with the year ending Nov. 30, 1880, was 45 per cent., or from a value of $7,411,904 to $3,934,865. In fresh beef the reduction is from $6,352,096 to $5,688,511; in hogs from $82,831 to $44,000; in sheep from $367,315 to $317,794, and in mutton from $183,542 to $132,287. In all these items together—live cattle, sheep and hogs, fresh beef and mutton—the falling off in exports from this port alone is $4,280,-129. It is to be noted that the decline in British receipts of living animals for the eleven months ending Nov. 30, was £1,673,000, showing that the falling off in importations from the United States was not made up from other countries.

The following table shows the importations of animals at this port for 1880 and 1881. These animals were chiefly thorough-bred horses, Norman draught horses, and Shetland ponies, Channel Island cattle, herds from Holstein, and me lium wooled sheep from the British Isles:

FOR 1880.	No.	Value.
For breeding, all kinds	1,174	$325,792
Horses paying 20 per cent. duty	37	9,445
For breeding— FOR 1881.		
Horses and ponies	919	$378,133
Jacks	10	3,895
Cattle	442	92,669
Sheep	300	6,867
Horses paying 20 per cent. duty	19	1,559
For breeding, all kinds	1 671	481,564

Values all per invoices.

—*New York Times.*

THE HIPPOPOTAMUS.—Dr. Henry C. Chapman, of Philadelphia, has recently devoted much attention to the anatomy of the hippopotamus, and has read an elaborate paper before the Academy of Natural Sciences of Philadelphia. We notice that he draws the following conclusions: "Beginning with the pig, we pass by an easy transition to the peccary, which leads to the hippopotamus, and thence in diversing lines to the ruminantia on the one hand and the manatee on the other. Paleontologists have not discovered a form which bridges over the gap between the hippopotamus and the manatee, but it will be remembered that certain ferril bones, considered by Cuvier to have belonged to an extinct species of hippopotamus, *H. medius*, are regarded by Gervais as the remains of the *Halithorerium fossile*, an extinct Sirenean, of which order the manatee is a living representative." Dr. Chapman adds further on, "I don't mean to imply that the manatee has necessarily descended from the hippopotamus," but he considers that "there is some generic connection between them."—*Science.*

JIBBING HORSES.—A correspondent, writing to the *Times*, propounds a new theory that jibbing is the result of "a temporary mental state" and that "the object in view should be to divert the small mind of the horse from its one prevailing idea." The writer proceeds to suggest methods of diversion, which will be diverting to the readers if not to the horse. For example, he recommends the drivers of "jibbing horses" to be provided with a small bottle of something that a horse abhors, and which stings or irritates. By placing a small portion on the tongue of the horse all its thought is directed to clean its mouth, and every other consideration is en-

tirely from its mind. We are incontinently reminded of the storied way of catching birds by sprinkling salt on their tails. No doubt the remedy would be successful. Meanwhile, there is nothing whatever new in the notion of jibbing being a mental vice—so is shying and so are certain forms of crib biting. That horses have temper and may become "moodish" or "modish," or savagely insane has been known to all students of comparative psychology and to most "vets" for a great length of time. Rarey recalled public attention to the matter a few years ago, and it was then clearly recognized by all intelligent horse trainers. Still better than the expedient recommended is to blow or whisper in the ear of a horse on the side opposite to that on which he inclines to kick—it is useless on the same side. If he either likes or dislikes the sensation enough to have his mind changed, he will go on. Nothing, however, can succeed in a case of *genuine* "jibbing," except it overcomes and cures the ill temper. In nine cases out of ten the jibbing is not genuine. The horse stops because the hames hurt him somewhere, and he is sulkily resolved not to proceed until the grievance is redressed. When there is no grievance the horse is like a perverse child, and "giving him something he does not like" is a form of punishment which diverts his small mind, just as the small mind of a child is diverted by a good whipping. We do not advocate whipping, but neither can we recommend coaxing. The best plan is to look for a cause of irritation, and to change the mind state, as we have indicated.—*London Lancet.*

SUPPLEMENT

TO THE

VETERINARY MEDICAL REGISTER

—OF THE—

UNITED STATES.

COMPILED FOR THE

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THE JOURNAL

OF

COMPARATIVE MEDICINE AND SURGERY.

VOL. III. APRIL, 1882. No. 2.

ORIGINAL COMMUNICATIONS.

ART. VI.—TUBERCULOSIS IN MEN AND ANIMALS: A STUDY IN COMPARATIVE PATHOLOGY.

BY THOMAS E. SATTERTHWAITE, M.D.

THERE are some practical questions relating to tubercle, or to the disease that commonly passes by that name, that have lately assumed unusual prominence in the public mind. One of them has arisen through the discussions in the public prints on vaccination, and we have been reminded from a certain quarter* that while the human family is being ostensibly protected against the scourge of small-pox, it is at the same time undergoing "physical deterioration" by being inoculated with other diseases that we know are extremely dangerous, if not deadly, in their effects upon the system. Then, again, the subject which the late Prof. Gerlach,† of Berlin, championed with so much activity has not been allowed to remain at rest, and we are told that the milk of tuberculous cows will produce tuberculosis in those who take it as food; and, not least of all, Toussaint is the authority who claims that the ingestions of raw meats and muscular juices, such as have become fashionable

* *Bergh.* The Lancet and the Law; North American Review, Feb., 1882, p. 161.

Vidal. Monthly Rev. of Med. and Pharm., Feb., 1882.

† *Gerlach.* Virchow's Archiv., 51, p. 290.

remedies for sickly children and invalids, is quite capable of initiating the same disease, if they have been derived from tuberculous sources.

It is proposed in the current article to review the subject of tuberculosis in such a way as to give a brief resumé of the various and, it may be said, alternating opinions that have been advanced during the many years it has been under discussion. In this way, the misconceptions and diversities of opinions that have so long prevailed will be better appreciated, and the reader will be gradually prepared to survey the ground upon which the matter stands at the present moment.

Among the early writers upon pulmonary consumption (for tuberculosis always enters into and forms part of one's ideas of consumption) there was an extreme latitude in the use made of the term tubercle. Bayle,* who is always referred to as one of the pioneers in this department, even named cancer as a form of tubercle. But, even after Laënnec's careful and masterly studies† had eliminated this and many other errors made by his predecessors, and given a rational if not a thoroughly satisfactory explanation of the pathological processes, we should not now have made much real progress towards the final solution of the matter, had not Virchow‡ still further narrowed the field of inquiry by rejecting from Laënnec's classification three out of four of that author's varieties of tubercle and all his tubercular infiltrations, and insisted that one form only, the miliary or the gray granulation, should be retained to represent the real tubercle of future scientific discussions

This was a great step forward, and this dogma has been recognized and respected up to the present day. Subsequently, histological studies (Niemeyer§) demonstrated that the infiltrated tubercle of Laënnec was more like a pneumonia, and it came to be thought that this *cheesy pneumonia* of phthisis was the frequent result of ordinary pneumonic inflammations. These ideas, however, were destined to receive a check from the researches of Von Buhl,‖ who claimed to have proved by experiments upon animals that miliary tu-

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* *G. L. Bayle.* Recherches sur la Phthisie Pulmonaire. Paris: 1810, p. 18.

† *R. T. H. Laennec* A Treatise on the Diseases of the Chest. Translated by John Forbes, M.D. New York: 1830, p. 278, *et seq.*

‡ *R. Virchow.* Die Krankhaften Geschwülte, II.

§ *Felix Von Niemeyer.* Clinical Lectures on Pulmonary Phthisis. Translated by J. L. Parke. New York: 1868.

‖ *Ludwig V. Buhl.* Inflammation of the Lungs, etc. Translated by Drs. Mann and St. John. New York: 1874.

bercles were secondary products, resulting from the conveyance of irritating particles from distant foci. Since this time, more than ever, the solution of the question has been sought through animal experimentation; but here, too, errors were frequently committed, because the previous condition of the animal and its individual susceptibility had not been sufficiently studied, for animals that are often tuberculous under confinement, were used in experiment, and thus the value of the results became extremely problematical. And so it has happened, from this and other causes, that, though many hundreds—and perhaps thousands—of animals were utilized in the inquiry, the results obtained were for a long time little calculated to establish conviction in the mind; because, though clothed in some sort of a scientific dress, they were not conducted under the rigorous methods that alone can bring such questions to a final determintion.

Thus, while frogs are prone to miliary tuberculosis, the carnivora are not—even those that like dogs, live on a mixed diet. On the other hand, rodents—such as rabbits and guinea-pigs—are quite susceptible, while the ruminants, and especially those of the bovine race, have a remarkable tendency in this direction. And yet even these general statements have to be modified in some instances. Thus while animals of the bovine race exhibit tuberculosis with great frequency in confinement, they are not so apt to when at large. Then again age enters into the problem; for, as in the man family, the tendency to miliary tuberculosis of the lungs is great in adults, while in infants the membranes of the brain and the intestinal tract are the points of election, so in some of the lower animals the site of the disease is largely governed by the age of the individual.

A more critical review of the historical part of this question leads us to the fact that pulmonary phthisis (consumption) in some form or other has been recognized from very early times. It was even alluded to by Hippocrates,* but while his clinical account of the disorder was sufficient to distinguish it, his pathological notions were vague and absurd. Galen † also recognized and wrote of the disease, but it seems more just to regard Bonet‡ as one of the first who described

* *Hippocrates.* Œuvres Completes, T. VII. Littré, 1851, pp. 77, 189, 208.

† *Galen.* Epitome Galeni Operum. De Methodo Medendi, Lib. V., 422, 423, 1643.

‡ *Bonet.* Sepulchretum Sive Anatomia Practica, Lib. II., De Respiratione Læsa, Obs. 19, 1679.

tubercle with any degree of precision. Certainly in the edition of 1700, by Mangetus, tubercles receive a pretty careful mention, and he even appears to have recognized the miliary bodies. Virchow,* however, associates this fact with the name of Baillie.† Tubercular phthisis seems to have been first described by Bayle,‡ who regarded it as a specific disease, to be distinguished from other forms of phthisis that he called melanotic, ulcerous, calculous, granular and cancerous. Of more than 900 cases enumerated by him, 624 were of the tubercular variety, and 183 of the granular. Laënnec,§ however, was the first to give a sharp and intelligible delineation of the morbid appearances, and the fame of his writings and teachings secured for the views a wide acceptance. In 1819 he wrote that tuberculous matter was to be found under two forms, the one *insulated bodies* and the other *infiltrated substance.* Of the former there were four principal varieties, the *miliary,* the *crude,* the *granular,* and the *encysted;* the infiltrated substance was *irregular, gray,* or *yellow.* For him tuberculosis (pulmonary) was not inflammatory, and pneumonia was not transformed into phthisis. These views of Laënnec were subsequently sustained by Louis.‖ Having examined the records in M. Chomel's service at the Charité, where 67 phthisical patients died during a period of three years, he was enabled to say "nos observations confirment celles de M. Laënnec, et que, pour nous comme pour lui, l'existence des tubercules dans les poumons est la cause et constitue le caractère propre de la phthisie," Let us see if, with all the vast mass of work that has been done for more than half a century since that date, we have succeeded in changing the full force of each one of these remarkable words. Lebert,¶ who brought the microscope to bear upon the matter, still further corroborated the teachings of Laënnec and Louis, asserting confidently that both forms of tubercle already mentioned were of the same nature, containing the peculiar bodies that he called "tubercle corpuscles." Somewhat earlier, however, Rokitansky** gave in his adhesion to the same view, but called attention to the multi-nucleated

* *Virchow.* Die Krankhaften Geschwülste. Vol. II.
† *Matthiew Baillie.* The Morbid Anatomy, etc., 3d Amer., Phila., 1820.
‡ *G. L. Bayle.* Recherches sur la Phthisie Pulmonaire, Paris, 1809.
§Loc Cit.
‖ *P. C. A. Louis.* Recherches Anatomiques Pathologiques et Therapeutiques sur la Phthisie, Paris, 1825.
¶ *H. Lebert.* Traite Pratique des Maladies Scrofuleuses, etc., Paris, 1849, p.
** *Rokitansky.* Lehrbuch der Path. Anat. Wien., 1855, p. 289.

corpuscles (mutter-zellen), which he had observed in the tubercle granulum. It would appear that the first break in this solid array of opinion was made by Rheinhardt,* who showed that the so-called infiltrated tubercle, which, strangely enough, he held to be the most characteristic form of tubercle, was in reality an inflammatory exudation undergoing transformation. It was now that Virchow made the first grand move towards simplifying the problem, for he was able to substantiate Rheinhardt's views, and in so doing at once showed the folly of retaining the infiltrated tubercle as part and parcel of tuberculosis, which all regarded as non-inflammatory (Laënnec, Louis, Lebert and Rokitansky). If, said he (in substance) the name is retained, let it apply to the gray granulation of Laënnec or of Bayle. For even the yellow caseating tubercle, he argued, is confounded with other totally distinct lesions, such as inspissated pus and encysted parasites. This event proved, as we have already said, to be the commencement of a new era, and simplicity ruled where all before had been misunderstanding and doubt. From this time on, scientific pathologists, when speaking of tubercle, referred to the *miliary tubercle.* Naturally, as the result of the great pathologist's teachings, doubt was thrown upon many conditions that had previously been grouped with tuberculosis, such, especially, as laryngeal phthisis, while Niemeyer† even went so far as to connect pulmonary phthisis with pneumonia, of which it was a legitimate sequel.

According to him, the two prominent conditions under which pulmonary consumption was found were: First, chronic pneumonia; second, chronic pneumonia with secondary tuberculosis; third, primary tuberculosis. But Buhl,‡ of Munich, acting perhaps under ideas foreshadowed by Virchow, had formulated a theory in accordance with certain experiments on animals, and he appeared to prove that miliary tubercles were caused by the presence of one or more special sources of infection, that might be located in the vicinity or at some distance. Accordingly experiments on animals were made in great numbers, with the view of testing the truth or fallacy of this new doctrine and now the conclusions of Villemin,§ that had been previously made

* *Reinhardt.* Cellular Pathology, 1860, p, 159.

† *Niemeyer.* Lehrbuch der Spec. Path. u. Ther., 7te Aufl. I., p. 250, Berlin. *Langhans* (Virchow's Archiv., 42, p. 382, 1868,) described them su sequently with some minuteness.

‡ *L. v. Buhl.* Loc Cit.

§ *J. A. Villemin.* Gaz. Med. de Paris, 1865, No. 50, p. 787. Etudes sur la Tuberbulose, etc. Paris, 1868.

public, but had met with little favor, came into prominence. Villemin, Professeur Agrègè at the Ecole Impériàle of Val-de-Grace, had accumulated some experiences that he had been publishing since 1865. He used rabbits and guinea-pigs, and various other animals for his studies, inoculating them with the caseous matter of human phthisis, and his results appeared to prove conclusively that pulmonary tuberculosis (phthisis) is a disease specific in its nature, and communicable by inoculation, producing the well-known eruptions of miliary tubercles. Many of the animals so inoculated died, while others emaciated, and were then killed. The lesions were found to be located in the lungs chiefly, to a progressively lesser degree in the spleen, liver, bronchial and mesenteric glands, according to the order in which these several organs are named. In ruminants and small carnivora, inoculation usually produced no appreciable effect, but with horned cattle the results were positive, the animal (one case) dying in six weeks of emaciation, tubercles being found in the lungs, pleuræ, spleen, liver, kidneys, and mesenteric glands. Villemin, in reviewing this particular case, held, therefore, that bovine and human tuberculosis are identical, notwithstanding the now well-known fact that there is a morphological difference between the two, and a specific deposit in the former that appears to pathognomonic of the bovine disease.

The views of Villemin were not cordially received by the committee of the French Academy to which they were referred, but they served to stimulate a number of workers in various parts of the world, and especially such representative English investigators as Wilson Fox* and Burdon Sanderson,† who early opposed the views of the French writer, claiming that the effects produced were due chiefly to the introduction of an *irritant* into the system.

They adopted much the same methods as Villemin, and obtained results that were very analogous, certainly in the matter of cheesy products and tuberculous nodules; but they also found that the same results were obtained by inoculating animals with matter that was not tuberculous. In fact, they concluded that any *mechanical irritant* may do the same thing. Accordingly, the views advanced by Villemin, that tuberculosis is a specific disease, received a preëmptory

* *Wilson Fox.* Brit. Med. Journ., May 23—June 6, 1868.

† *Burdon Sanderson.* Med. Times and Gaz. 1868, p. 431.

check. Given, they said, any material that will produce a caseous deposit, no matter what that first cause may be, we then have a starting point from which miliary tubercles can be developed. These views were, therefore, in agreement with those of Buhl, and the chronological sequence of events was no longer deposition of gray tubercles, their aggregation, softening, caseation, and, subsequently, caseous infiltrations of the lung, but caseation at some point in the body, the lung, or anywhere else, then deposition of the gray bodies, and subsequently their aggregation, central softening, and, lastly, caseation.

This latter point was confirmed by Fraenkel and Cohnheim,* who demonstrated on rabbits and guinea-pigs that any centre of suppuration in the body, at least in rabbits and guinea-pigs, will serve as the starting point for a general tubercularization. Such animals, therefore, are auto-inoculated, or, in other words, poisoned by their own secretions. These experiments had been repeated so many times that it seemed to be finally established that the order of phenomena was really as has already been indicated, and efforts were made to show in what various ways the same result may be accomplished, rather than to topple over a theory that had such a substantial basis in observed facts. In 1873, the great discussion on tuberculosis, calling out as it did an expression of opinion from those who had enjoyed the amplest experiences in Great Britain, was a further effort, and a successful one, which tended very largely to make the clinical distinctions of phthisis conform to the more modern pathological notions. In this discussion, Wilson Fox,† taking as a typical example the acute tuberculosis of children, found three sets of changes: first, the typical gray granulations; second, granulations composed of epithelial products, with growths in the walls of the vessels; third, large areas of the lung similarly affected, but in which the vesicles were almost completely obliterated, and the capillary circulation nearly abolished. Tubercle, he thought, was not histologically so simple as it had been described. Tuberculosis and phthisis were one and the same thing, the differences in different cases being comprehensible by supposing that they were different stages of the same process. If he were making a classification it would be merely into two varieties, acute and chronic, and the term

* *Cohnheim and Frænkel.* Virchow's Arch. 45, p. 216.

† *Wilson Fox.* Trans. Path. Soc. of London, 1873: Vol. xxiv, p. 307.

tuberculosis or phthisis might then be used according to individual preference.

Thus one readily sees how thoughtful studies of the pathological sequence of events may explain in a simple way the observed train of clinical phenomena.

Moxon * of London, on the same memorable occasion, claimed that pulmonary tuberculosis should not be regarded as a specific disease, i. e., in the sense advocated by Villemin, but rather as a special phase of inflammatory action. He associated tubercle with all forms of active phthisis, basing his views upon an examination of more than 500 bodies. There was but one exception, and this was when the disease had progressed slowly for a very long time; then the lung fell into the condition known as fibroid phthisis, and the caseous matters had been thrown off. In such a case, nature was operating to effect a cure. To him all phthisis was the tubercular phthisis of Laënnec and Louis, but broncho-pneumonia had no connection with it.

Let us now for a moment advert to the anatomical components of the miliary tubercle, and observe that as some ten years ago we were in the habit of picking out a gray granulation, tearing it to pieces under the microscope, and demonstrating the adenoid tissue, with its accompanying small corpuscular elements, as the essential features, and then in later years bending our attention to the giant cells, which were with great pains, if at all, dug out of the interior, then seeking with equal anxiety for Schüppel's epithelial bodies; † so now it is the fashion to emphasize another symptom, and this is central caseation, which appears to be uniformly present and readily recognized by the eye.‡

Now, in order to reconcile these different microscopic appearances in accordance with the idea that they are all proper constituents of a tubercle granulum, it will be necessary to again retrace our steps a little.

(*To be continued in next number.*)

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* *Moxon.* Trans. of the Path. Soc. of London, loc cit.

† *Schüppel.* Virchow's Archiv., 56, 1872.

‡ Some observers have not given in their adhesions to the simple ideas that have been indicated as offering a logical and satisfactory explanation of the pathologico-clinical history of pulmonary phthisis, but prefer to classify it in agreement with special microscopic findings.

Petroff. Virchow's Archiv., 44, b. 129.

ART. VII.—OBSERVATIONS ON THE DEVELOPMENT OF SPECIAL SENSES.

BY JOHN DEAN CATON, LL.D.

It has been long observed that there is a wide difference among the different species of animals in the measure of sensibility in their various organs of sensation, and yet, so far as I know, the comparative physiologist has failed to detect sufficient reason for this difference in the structure of the organs.

In man the senses of seeing, hearing and of smell are all dull in comparison with many of the brute creation, while the sense of feeling is probably more acute than it is in most of the lower orders. In many of the brute creation some of these organs are very acute and discriminating, while others are obtuse. Then, again, we may often observe a wide difference between individuals or varieties of the same species of animals in this regard. Take, for instance, the pointer and the setter-dog. Their sense of smell is very strong and discriminating, being able to distinguish different kinds of animals and birds by their odor alone and to determine the direction of their locality, at least approximately, while their sense of sight is dull. For instance, I have been led in the prairie a considerable distance by the dog up to a young grouse, which refused to rise till the dog was within a foot or two of the bird and in plain view, when the dog, being urged on, would spring forward to strike it with his front feet, but in a majority of cases would miss the bird by striking too far or not far enough or a little to one side, when if he had seen it he could not have failed to strike it. It may be said that long habit of the dog, having always depended upon the sense of smell and never upon sight, made him indifferent to all objects which came within the range of vision. Long habit of the active use of the sense of smell and the partial disuse of the sense of sight may have sharpened one and blunted the other, especially when this habit has been continued through many generations until its effects may have become hereditary. But can the physiologist detect any difference or any change in the structure of these organs which would tell him of the change?

Can he detect any difference in the organs of sight or of smell between the fox-hound and the grey-hound? The former pursues his game by the sense of smell alone, while the latter depends entirely upon the sense of sight. What difference does a critical examination disclose in the structure of these organs in the two varieties of the dog.

Thus far we have been dealing with an animal which has long been subjected to the dominion of man and to his modifying influences. Let us now turn for a moment to the wild animals. Take, for instance, the cervidea. Careful observations has shown that their sense of sight is very dull, while their senses of hearing and of smell are exceedingly sharp. These peculiarities apply to a whole race, and cannot be accounted for by any artificial means or peculiar surroundings. If the high senses of hearing and smelling are necessary, and so have been highly cultivated to enable them to avoid danger, why has the sight been neglected? Does the comparative physiologist find in the structure of these organs a satisfactory explanation for these extremes? Many other quadrupeds might be mentioned where wide differences in the sensitiveness of different organs are observed, but enough has been said to call attention to the subject.

We are not less interested when we study the habits of the birds. With these this is not a new subject or a new investigation. It has long been a question among careful observers whether a bird possesses the sense of smell—at least to a discriminating degree. The comparative physiologist unhesitatingly answers that they do, and many of them to a very high degree. He finds the organs of scent highly developed, and hence concludes *a priori* that they *must* possess the capacity to smell in a corresponding degree. But here the careful observer must be heard as well as the careful physiologist. It will not do to say that, if the facts dispute the theory, it is all the worse for the facts.

For myself, I have been a careful observer of facts tending to throw light on this subject, and have never yet found conclusive evidence that any bird possesses the power to smell. While many birds may possess that power, and that to a discriminating or even a high degree, I have failed to find one where opportunity offered which responded to the test. My opportunities for observing and testing nearly all of our game birds and water-fowl which are sought

by sportsmen have been as good as those of most men, and I have tried to observe as carefully and impartially as I am capable of, and in no instance have I been able to detect any evidence that they could by the sense of smell alone detect the presense of an enemy under any circumstances. Many times have I lain carefully concealed, with a dog by my side, close to the edge of a water literally covered over with several species of ducks and geese, with the wind blowing from me to them, without being detected, even when some would come within a few feet of me. One such experiment had more interest to me than to have bagged all the birds upon the pond. A flock of ducks or geese will fly over and very near a man who is concealed without noticing him; but let them once get a glimpse of him, and they will sheer off in the greatest confusion.

My experience in this regard is not singular or exceptional. I never yet inquired of a sportsman who had not made the same observations, if he had thought of the matter at all. When approaching birds no one ever thinks of the course of the wind, while in stalking deer that is the first thing to be considered. With hunters of considerable experience this habit becomes intuitive, and is adopted almost without thought.

I have on two occasions had the same experience with pinnated grouse, where flocks of the birds, when seeking their food, have come very close to me, against the wind, without detecting me. Often I have lain concealed very close to a large flock of wood pigeons when feeding, with the wind blowing from me to them, without the least sign of detection being manifest. It is idle to say the birds were too busy to notice me if they did smell me, for the first glimpse of me by sight sent them away in haste.

The wild turkey, too, which has the reputation of having the keenest and most accurate sight of any living thing, seems to be quite destitute of the power of smell, although the comparative anatomist tells us that he has a good set of nasal organs, and should smell very well. I make nothing of my observations made in my acclimatization grounds at Ottawa, where I have kept them in large numbers for many years; but when hunting them in the woods I have had excellent opportunities for observation.

The wild turkey will approach the hunter in answer to his call from any direction, regardless of the course of the wind. He is a very suspicious and cautious bird, and may circle round the place

whence he hears the call, trying to get sight of the hen that he thinks is calling him, but he never takes the alarm from smelling the hunter. If he can get the least glimpse of the smallest portion of his person, he is away instantly, or if he hears the least unusual noise or other suspicious circumstance; but never from smell.

I was once hunting on the Vermilion River, and saw at a considerable distance a large flock of wild turkeys cross the river and take a course directly towards me. I was at the foot of the bluff, near the top of which the underbrush, which clothed the side of the bluff and the bottom below, disappeared. I placed myself by the side of a tree, in a very dense thicket, with only my head above it. I soon heard the turkeys approaching, as I anticipated, distinguished by the constant *quit! quit! quit!* I stood perfectly still with the dog at my feet as the whole flock passed to the leeward of me, some of them but a few feet away, but beyond view. I saw their course would take them to the open near the top of the bluff. I stood without a motion, with the rifle at my face supported against the tree. At length, the head of the leading cock appeared, and instantly a loud note of alarm told his mates that I was discovered. That head and a few inches of the neck were alone visible for perhaps two seconds, when all took wing. Let me add, by way of parenthesis, that, before I had taken down the rifle, I heard a crash in the brush, and presently the largest common deer I ever killed, or ever saw, stopped opposite me in his rapid flight, not one hundred feet away. He had winded me, and stared directly at me for a few seconds and then bounded forward, and, after a few leaps, passed through an open space, when he fell to the earth never to rise again. Now, this deer detected my presence by its sense of smell when it was impossible to see me, for I could only partially see the outline of his form in the thicket, while the turkeys had passed me much nearer, and with an equally favorable wind, without giving the least evidence of a sense of smell; but the want of this sense was largely compensated by a quickness and accuracy of vision which I had not expected, familiar as I was with the habits of the bird. I could greatly multiply my own observations, all tending to show the feebleness or total want of the sense of smell in various species of the feathered tribes, and that the loss of this power is largely compensated by an increased power in other senses, but it would occupy more space than can be allowed me.

After all, this is a question of fact against theory; of observation and experience against what is claimed to be scientific deductions; for certain it is that the comparative physiologist has found the organs of smell in most species of birds, and in many in a very high degree. I am not able to state the exceptions, if there are any, as directly in point. I cannot forbear referring to the experiments of Mr. Audubon and Dr. Bachman upon the turkey-buzzard and the carrion-crow, as detailed in Audubon's American Ornithological Biography, vol. ii., p. 33, *et seq.* Some of these experiments may be briefly mentioned. Mr. Audubon stuffed a deerskin with hay, and when thoroughly dried, so as to emit no odor, laid it in a field, where a vulture attacked and worked at it and tore it till he exposed the contents, when, finding nothing he could eat, he left. He then took a dead hog, which he placed in a ravine, and covered it with vegetation, so it could not be seen, and there left it till so decomposed that it tainted the air to an intolerable degree for a long distance. The turkey-buzzards, which flew over and around the place and in the tainted atmosphere, did not discover it and paid no attention to it, although dogs were drawn to it by the sense of smell. He also had some young buzzards in a cage, which were ravenous at the sight of food, either fresh or offensive, but gave no signs of recognition when any kind of food was placed very near them which they could not see.

When these experiments were published, with the deduction that these birds find their food by the sense of sight rather than by that of smell, they were extensively and even harshly criticised in many quarters where it had been an adopted and even cherished theory that they are guided to their food principally or very largely by the sense of smell. Upon this Mr. Audubon requested Dr. Bachman, an eminent naturalist, to institute original and exhaustive experiments with the same birds in pursuit of the same inquiry. Dr. Bachman called to his aid a number of learned and scientific men, and they instituted a set of crucial experiments which were conclusive in the minds of all of them that these birds are led to their food by the sense of sight, and not by their sense of smell, and, it seems to me, must convince the impartial inquirer after truth that the sense of smell, if they have any at all, is so feeble as to be of no practical use to them in getting a living.

I may mention a few of these experiments. A quantity of offal

and other animal matter were placed at the back of the garden, and a frame put around it so as to raise the brush with which it was covered a foot above the animal matter, leaving the sides open. This laid there for weeks, and became a very offensive mass without being discovered by the buzzards who were flying about it, and frequently very near it, through the tainted atmosphere. Then the most offensive portion of this matter was taken out and covered with a thin canvas cloth, on which pieces of fresh meat were placed. The birds lit upon the canvas and devoured the fresh meat. They never discovered the putrid and offensive mass beneath, although their bills were sometimes within an eighth of an inch of it. Then a small slit was made in the canvas, through which the birds discovered the food below, and at once attacked it. An experiment was tried with a blind bird. When food was placed in its mouth it was devoured with wonted eagerness; but when held within an inch of his nostrils no matter how offensive the food, or how hungry the bird, he did not notice it. These experiments with this blind bird were continued for twenty-four days, and always with the same result.

In order to determine whether these birds may be led to their food by the sense of sight alone, they made a coarse representation of a slaughtered sheep and exposed it in the field. The birds were directly attracted to it, and attacked it vigorously, and seemed greatly disgusted at the barren results.

Richard Owen, in his excellent work on Comparative Anatomy and Physiology, vol. ii., p. 132, gives our vulture very excellent olfactory organs, the nerve of which is five times as large as that of the wild turkey. He is so persuaded that these organs were made for use that he attempts to explain the two first experiments, above related by Audubon, consistently with an active sense of smell in the vulture; in the first, that the vulture, seeing the stuffed deerskin, thought he would try it, although he could smell nothing there, and in the case of the putrifying hog in the ravine, he concludes that, although the vultures smelt the carrion, not being burrowing animals, they would not venture upon an attempt to uncover it. We may regret that Mr. Owen did not favor us with his views upon Audubon's experiment with the young vultures, and especially of the experiments made by Dr. Bachman and several other eminent scientists, which were far more severe and conclusive, and seem quite incapable of explanation consistent with any power in those birds to distinguish anything by the sense of smell.

I have written this paper more to excite inquiry and investigation by those qualified to make them, than to establish a theory. The facts which are well established are that, in many animals, certain organs of sense are very dull, while others are remarkably acute. Is this explained by an examination of the organs themselves? Many birds, at least, have little capacity for smelling, if not entirely unable to do so; and, in that case, are the organs of smell dormant or nearly so, although present, and is it possible to detect any physiological cause for this? It seems to me that here is an interesting field for enlightened and impartial inquiry.

ART. VIII.—FOREIGN BODIES IN THE ANTERIOR CHAMBER OF THE EYE.

BY WILLIAM OLIVER MOORE, M.D.,
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The eye, though so well protected by its natural coverings, the upper and lower eyelids, and, in some animals, by the nictitating membrane, is often taken by surprise, and foreign bodies enter its cavity.

Most foreign bodies enter the anterior chamber from without by injury, yet a few find their way thither through the blood, and then manifest their nature.

We will first speak of those which enter from without by injury inflicted upon the organ. The substances thus found in the anterior chamber are very numerous. The following are among the more common: Steel, iron, glass, gun-cap fragments, stone, wood, powder, and many others.

Such substances may pierce the cornea without passing through it, and project into the chamber. They may enter the latter completely, and lie in the bottom of it, or they may stick in the iris. The removal of the foreign body which seems to be urgently indicated is not always easy, especially in the inflamed state of the eye, and re-

quires manipulations likely to increase the inflammation and lead to defect of vision. So, often we have to choose between the two evils—continued inflammation from the presence of the foreign substance, or danger to the eye from the operation to remove it.

As a general rule, however, it is best to remove them as soon as possible with the least amount of violence.

In those instances where the substance has not entirely passed through the cornea, but is still held partly by it, one end lying in the anterior chamber, it is often difficult to select a method of procedure. In these cases attempts to grasp the body by forceps from without will often force it into the chamber, thus complicating the situation. In such a case, I would advise that a flat-bladed knife be made to pass through the sclero-corneal junction into the chamber, and passed immediately behind the inner point of the body, thus keeping it in position; then cut down through the cornea at the point of entrance of the substance; reaching it, grasp by fine-toothed forceps, and remove it; then gently withdraw the knife from the chamber, which has been used simply to steady the body.

In those cases where it has entered the chamber and is lying at its bottom, and where iron or steel are entangled in the tissue of the iris, we may resort to the following procedure: Take a reamer-knife and make a small incision at the sclero-corneal junction opposite the foreign body, allowing the instrument to pass into the chamber; then gently withdraw it, at the same time making slight pressure on the lower lip of the incision, thus favoring the escape of the aqueous humor, and with it, in most cases, the foreign body. If it should not come away with the aqueous, forceps may be introduced through the incision, and the body grasped, or, in the case of its being iron or steel lying loose, or entangled in the iris, a magnet may be introduced, and the foreign bodies be thus removed. These magnets are now made in very practical shape for this purpose, that by Dr. Gruening being the most convenient. In some of the cases where the body is entangled in the iris other than iron or steel, in which it cannot be removed alone, it is perfectly proper to do an iridectomy, including the body in the portion of iris removed.

As to the substances found in the anterior chamber which come from the blood, we will first speak of the products of inflammation sometimes found here, and then of those entozoa which make this their abode.

Hypopyon or pus, in the anterior chamber, is a frequent symptom of severe keratitis or iritis. The pus is found always at the bottom, and has a crescentric-shaped appearance. If the position of the head be changed for any length of time, the pus will gravitate to the most dependent portion of the chamber; thus we are able to distinguish between free pus in the aqueous and that infiltrated in the corneal substance. In those instances where the hypopyon is not absorbed by medicinal measures, such as bathing with hot water, instillation of atropine, and the like, resort may be had to surgical measures, namely, paracentesis corneæ, thus evacuating the pus. In most cases the warm applications and atropia will cause absorption. Hyphæmia, or blood in the anterior chamber, may arise either from traumatism or from inflammatory action; in either case the appearances would be the same, the amount of blood and the length of time since the occurrence varying the picture. The treatment suggested for hypopyon is applicable here also. Cholesterine crystals are sometimes found in this part of the eye, generally in eyes the seat of old irido-choroiditis. The crystals may be seen heaped in a mass at the bottom of the chamber, or scattered over the posterior layer of the cornea, or, as in many instances, on the anterior surface of the iris. The shiny white and yellowish crystals give a beautiful appearance, especially when light is thrown on them. No treatment is called for, as this condition usually occurs in sightless eyes. Gummy and spongy exudations are also found in this space.

Entozoa of two varieties are found to inhabit this region, namely, the filaria and cysticercus. Various names are given to this parasite according to its location, as, Filaria oculi humani; F. equini; F. papillosa, and F. medinensis.

It is a specie of the Guinea thread-worm, but smaller; the variety found in the eye is known as F. papillosa. It has long been known that this parasite is occasionally found floating about in the anterior chamber of the horse's eye; though rare in this climate, it is by no means uncommon in India, where it is seen only during the cold months, not being observed before the beginning of October or later than the end of February.

The more constant the rain during the periodical rainy season, particularly toward its close, the more numerous the cases of filaria during the subsequent cold months.

It occurs chiefly in the low districts, being rare in the upper provinces, where the soil is drier. At Poonah usually twenty cases occur annually. One year thirty cases were seen; and at Ghazepoor, higher up, situated on dry soil, none were observed. During the rainy season the water is stored in large tanks for use during the subsequent dry season. In this water has been found a "tank-worm," by some thought to be a larvæ form of filaria, which, when taken into the system, develops and finally reaches its habitat in the aqueous humor.

The worm is very active, and swims about in the aqueous, sometimes going through the pupil to the posterior chamber. Usually one is found, but cases are on record where two have been seen in the same eye. The worm is about one inch long, equal in size to sewing-thread, white or darker colored, having a mouth, simple intestinal canal, uterus, and prominent anal aperture.

If the parasite is very active, the irritation of the eye is considerable, causing redness, turbidity of the aqueous, and in some cases keratitis, which, if not relieved by removal of the worm, will cause destruction of the eye.

These results may be prevented by extracting the animal, by paracentesis corneæ, the aqueous on escaping carrying the worm along.

Should it not come away at the first operation, after a day or so it may be repeated. A case is reported where the tapping the chamber so disturbed the animal that it died and became subsequently absorbed.

This worm has been seen in the horse's eye in Europe and in this country. In this city a number of cases have been operated on in the past twenty years; it is, however, a rarity in this climate.

It has been found in the gadus æglefinus (haddock) in the aqueous, and also in the human eye. When found in the latter it is called F. oculi humani. The symptoms of irritation are the same as in the horse's eye.

In some fishes they are so numerous in the crystalline lens as to render it turbid and opaque. They have been found in the human lens, between the capsule and its surface; a case is on record where one was found under the conjunctiva oculi and extracted.

Cysticercus Cellulosæ.—This hydatid, consisting of a globular vesicle with a slender neck, of which the end is a trifle enlarged,

forming a head with projecting hooklets, has been found in the human eye, usuallyin the anterior chamber, sometimes in the back part of the eye. It is also found in the eye of the pig.

This parasite is taken into the human system by eating pork. Pigs affected by this are said to be measled, and their flesh is called called measly pork. The French term the affection ladrerie, while the Germans call these creatures fiunen.

About twenty cases have been reported of cysticercus in the human eye—the first by Soemmering, in 1829. The diagnosis is not difficult; the vesicle shows at times very decided movements, especially when the pupil is stimulated to contraction by the action of strong light, the head and neck of the animal being then stretched out and moved about. The vesicle may either be free in the chamber or be partly adherent to the iris or cornea. They grow rapidly at first from the size of a pin's head to be as large as a pea, in some cases larger. When they are in the anterior chamber it is proper practice to extract the vesicle entire, if possible, as the contents are irritating, and if ruptured might cause serious inflammation of the eye. They are also found in the orbit and vitreous humor. In the pig's eye they present the same appearance.

IX.—PATHOLOGY OF THE NUTRITIVE CHANGES IN THE CARTILAGES AND OF ACUTE SYNOVITIS: ONE OF A COURSE OF LECTURES DELIVERED AT THE COLUMBIA VETERINARY COLLEGE, N. Y., IN 1881–82.

BY WILLIAM HENRY PORTER, M.D., D.V.S.,
Professor of Surgical Pathology and General Surgery.

To-day, gentlemen, we commence the study of one of the most important departments of Surgical Pathology, viz.:

Diseases of the Joints.—First, let us consider some changes in-

volving the cartilage alone, but not always producing a serious lesion of the joints, as a whole.

Like the bones, the cartilages are subject to structural changes. We have already learned that the cartilages contain no blood vessels, but receive their nourishment from the surrounding structures. Consequently, lesions of the cartilages may follow direct irritation or an arrest of the proper nutritive supply.

Changes brought about by irritation can easily be studied by experimenting upon permanent cartilage. Expose, for instance, a part of the surface of a cartilage, and at the end of two weeks we will find the exposed and injured surface covered over by a gray pulpy layer. If we make a thin section which will include both this pulpy layer and the cartilage beneath, the following conditions will be found in that portion of the cartilage which is furthest from the primary wound. The cartilage capsules contain cells, whose nuclei are easliy rendered visible, but as we approach the solution of continuity, the cells become larger than normal, and the protoplasm more abundant. The nutrition is increased, the cells become irritated, enlarged, and as a result the nucleus and its surrounding protoplasm tend to divide. In this way we soon have a distinct mass around each nucleus. This constitutes what is termed by some writers a formative irritation; that is to say, the irritation has increased the number of cartilage cells. Each of these newly formed cells excretes around itself a cartilaginous substance, and thus forms a new and independent capsule. Up to this point, there have been only changes of structure and property which the cartilage cells nominally possess, but brought about more rapidly than naturally is the case. This zone of subdividing cartilage cells varies greatly in thickness.

As we approach the free surface, we find the cartilage substance broken into festoons, each excavation corresponding to an opened cartilage capsule, which has burst at its most superficial margin. By the side of these open capsules we find some that are unopened, which, however, are filled with young cells, which tend to destroy the formative property and ultimately cause their rupture.

The gray pulpy mass, visible to the naked eye, which we found upon the surface, consists of young and newly formed tissues, in which blood-vessels may be developed, taking their origin from the adjoining synovial membrane. This newly formed tissue, you will readily

appreciate, has been developed from, and at the expense of the cartilage proper, which gradually disappears, and is replaced by this new material.

We have other changes in the cartilages which are secondary to a change in their nutritive supply, or the general nutrition of the system as a whole, namely: *Fatty degeneration, infiltration of urates, mucoid degeneration,* and *calcareous infiltration.*

I. Fatty degeneration should not be confounded with fatty infiltration, so common in old cartilages. Fatty degeneration causes death of the cell elements of the cartilage; so that, in place of the capsules and their contained cells, we find that they are replaced by fat granules. The intercellular substance is soft and often undergoes segmentation. These changes are primary lesions, and not secondary to a previous inflammation. In inflammation we have an opposite condition; that is, the few fat granules normally present, rapidly disappear.

II. We sometimes meet with a deposition of the crystals of urate of soda, magnesia, or lime; generally the former. The crystals in this affection are primarily deposited in the cartilage cells, and later may involve the fundamental substance between the cells. This gives rise to the condition known as gout, or gouty arthritis.

III. There is another condition of the cartilages which has been termed mucoid degeneration; which, however, is a normal physiological process in the costal cartilages, and is occasionally seen as an abnormal process in some of the joints. In this form of lesion the protoplasm of the cells undergoes a mucoid degeneration, which is generally accompanied by a segmentation of the basement substance.

IV. Occasionally we meet with infiltration of the cartilage with calcareous salt. This condition is the opposite of the infiltration of urate of soda, or gouty infiltration. In this lesion the inorganic salts are deposited first in the cartilage capsules, gradually extending into the intercellular substance; but the deposit never attacks the cartilage cells proper, in this respect having a distinct difference from the gouty lesion.

This histological point of deposition is of considerable practical and theoretical importance in comparative pathology, especially in sustaining the theories of gout and rheumatism. It has been held

that gout was due to the incomplete assimilation of the nitrogenous foods, the rheumatism to the incomplete assimilation of the starches and fats—the former surcharging the blood with uric acid, which is followed by the deposit of the urates in various parts of the body. In the latter, it is supposed that the blood is surcharged with lactic acid, and, as a consequence, inflammation of the fibrous elements follows. Some seem inclined to think that both gout and rheumatism are the same, from the fact that in some of the lower animals and birds chalky deposits are found. I am inclined to think that these chalky deposits come under the head of calcareous infiltration, and not gouty infiltration, and until a number of microscopic examinations have been made to prove positively whether the capsule or the cell itself is primarily involved, it must remain an open question. All these changes are met with occasionally, and probably they are more frequent than is commonly supposed, owing to the lack of close observation.

Having considered these few trivial affections of the cartilage, independently of the joint as a whole, we are ready to study the lesions which may involve all the structures of the joint. Before commencing the study of these lesions (or articular diseases), we must first review briefly the structure of the most important parts which are included in the term "joint," and which go to form a normal articulation.

The cavities of all diarthrodial articulations are limited by the surface of cartilage covering the articulating extremity of the bones and the synovial membrane which is stretched from bone to bone, thus forming a shut sac. If a section is made through one of these joints they will always be found the same. If we take a section of of the cartilage and examine it from its free surface down to the bony connection, we find the following:

I. Along the free surface the cartilage capsules are lenticular or flattened.

II. A second layer made up of round capsules which, as a rule, contain only one cell, will be met with.

III. A third layer, which lies below the second, is composed of capsules which are lengthened perpendicularly to the surface, and each primary capsule contains two, three or more secondary capsules, lying directly behind each other.

These enlarged primary capsules form linear series which are continued into the deepest layer, or bottom, of the cartilage, where we find a narrow band, an infiltration of calcareous salts, which unite or cement, as it were, the cartilage to the underlying osseous tissue.

All the cartilage cells contained in the capsules of the first and middle layers normally contain granules, and even one or more fat droplets.

The calcified layer is bounded on the cartilage side by a sinuous line, on the bony side there are marked depressions and prominences, in the hollows of which fit papillary projections from the underlying bone, and *vice versa*, thus dovetailing the cartilage and bone together. In the centre of each of these osseous papillæ there is a medullary and vascular cavity, which communicate with the medullary and vascular spaces of the spongy or cancellated bone from which they spring. If the blood plasma reaches the cartilages from this side, it must of necessity pass directly through this osseous papillary and adjacent calcareous layer. These two layers being devoid of blood canals, it is argued by some writers that the cartilage receives no nutriment whatever from this side, but gains its whole nutrition solely from the fluid of the joint cavity. It seems quite probable, however, as is held by many, that the cartilage derives nourishment in part from all sides.

In studying the synovial membrane, we have a plain and a villous layer to consider. The plain layer is composed of a layer of fibrilated connective tissue interspersed with elastic fibres, and is in direct continuity with the perivascular connective tissue. This portion of the membrane is lined by a single layer of flattened connective-tissue corpuscles, called endothelial corpuscles, which closely resemble those seen on larger serous surfaces—as the pleura and peritoneum.

The villous surfaces, commonly called the synovial fringes, are best seen at points where the membrane is arranged in folds, in its passage from one surface to the opposite. The bases of these fringes are formed by the partial or complete opposition of the supporting layers of the synovial membrane proper. Between the two layers formed by the folding inward of the membrane we find a layer composed of loose connective tissue, adipose masses, and numerous blood-vessels which

supply the fringes. As these fringes are very thin, they can be quite easily examined microscopically by separating them at the base and spreading the remaining portion on a slide, in glycerine and water, and covering it with a circle. If the fringe should chance to be congested, we will find the artery and vein distended and a very dense capillary network at their free border. From the extremity of these fringes we see bodies of various shapes projecting into the synovial cavity. Some are fusiform projections composed of an axis-cylinder of fibrillated connective tissue substance, covered by two or more layers of flattened cells. Prolongations frequently join them together which contain nuclei, so that they present a double contour. The cell bodies which cover these projections are almost identical in their appearance with those seen upon the choroid plexuses of the ventricles of the brain. Some of these papillary projections are club-shaped, their free extremity being much larger than the connecting stem. When they are club-shaped, the connecting central axis is much smaller than that of the straight variety. This form occasionally contains cartilage corpuscles. These cartilage corpuscles are a nucleus from which cartilaginous tumors spring, which may become detached and form a free foreign body in the joint cavity.

Vessels, nerves and lymphatics have been traced into the synovial membranes.

The synovial membrane does not cover the whole articular surface, but only a portion of the outer border. To just what point of the articular surface the membrane reaches is hard to determine, because it rapidly becomes thinner from the circumference to the centre, and blends with the perichondrium, soon becoming so thin that it cannot be positively traced.

The whole surface of the synovial membrane is not found completely covered by the so-called endothelial corpuscles. Only patches here and there are smooth and glistening in appearance, the intervening spaces being opaque.

The synovial fringes play a very important physiological function. The superficial cells have been supposed to secrete the synovial fluid, but it must come indirectly from the underlying blood-vessels.

The synovial fluid is rather complex in composition, as may be seen by this table, which gives the analysis of a number of observers:

	I.	II.	III.	IV.	V.	VI.	VII.*
1. Water.	98.03	94.00	96.57	96.99	94.85	92.83	92.80
2. Albuminous Matter. . . .			1.90	1.57	3.51	5.01	6.40
3. Albumen.	.53	3.50					
4. Extractive Matter.						.38	
5. Gelatine.	.93						
6. Mucin.		.50	.32	.24	.56	.65	
7. Fats.			.60	.06	.07	.06	
8. Soluble Salts. .			1.06	1.18		.87	.75
9. Insoluble Salts.					.99	.04	
10. Muriate of Soda.	.23						
11. Ash.		1.+					
12. Fixed Alkalies	Trace.						
13. Lime Phosphate	Trace.						
	99.72	99.+	99.91	99.99	99.98	99.84	99.95

From these different analyses, it is quite apparent that this fluid varies but little in its general composition.

If we examine a drop of this synovial fluid under the microscope, we find that it contains, in addition to fat molecules, a few amœboid corpuscles as well as cells similar to those which occur on the surface of the membrane. The phosphates of lime and soda are the principal salts.

Now that we are familiar with the structures entering into the formation of a normal articulation, we are ready to consider the pathological changes in the same.

Joint Diseases constitute the most important branch of surgical pathology for the veterinary surgeon to familiarize himself with.

Before studying diseases of the joint as a whole, let us consider, first, the pathology of inflammations which attack only the synovial membrane.

When we use the term synovitis, it can mean but one thing—an inflammation of the synovial membrane alone.

I *Davy, John.*

II. *Thudichum.* A Manual of Chemical Physiology. New York: 1872.

III., IV., V. *Frerichs.* R. Wagner, Handwörterb, d. Physiologie, Bd 3, Abth, I. S.463.

VI. *Hoppe-Seyler.* Physiologische Chemie. Theil III, S. 623.

*VII *John.* Berzelius Lehrbuch übers. von Wöhler. 1831, Bd. IV. S, 461.

The synovial, like serous membranes, have the power of secreting a fluid called synovia, which is for the lubrication of the joints.

When an inflammation attacks this membrane, the quantity of synovia is greatly increased.

At the commencement of the inflammatory process, the vessels grow large and tortuous, the membrane loses its former lustre, and occasionally from the first it has a cloudy, yellow-reddish color; later, it becomes red and velvety. Upon the surface of the membrane we often find a layer of fibro-plastic matter, variable in thickness, similar to the plastic layer so commonly met with in pleuritic inflammations (by some called pseudo-membrane).

Microscopically the entire membrane or tissue is found infiltrated with plastic material; and upon the surface there is an abundant infiltration or collection of cells, giving the surface the appearance of a mass of granulations, the most superficial of which resemble closely pus cells. In the immediate vicinity of the distended blood-vessels, we find large quantities of wandering cells, which are undoubtedly the white-blood corpuscles which have escaped from the vessels and collected in the surrounding tissues. One peculiarity in synovitis is this, that the red-blood corpuscles, as well as the white, escape in great numbers, which is said to be an exception to the general rule of inflamed serous membranes.

The pseudo-membrane is composed entirely of small round cells, held together by coagulated fibrin. The normal striated or fibrillated appearance of the underlying connective tissue is less distinct, and now has a gelatinous or mucous consistency, and closely resembles granulation tissue.

The fluid of the joint is constantly becoming more and more cloudy, at first due to a few pus corpuscles, but later in the disease it becomes decidedly purulent.

In a short time the synovial membrane becomes so intensely congested that the distended capillaries are easily recognized by the naked eye, and the membrane somewhat resembles a sponge.

The membrane soon becomes nodulated and granular, representing a true granulating surface, from which pus is constantly being discharged. At this stage the inflammation may subside and the membrane be restored to its normal condition, but when prolonged beyond this point and suppuration continues, there will be a marked

loss of substance, and the only possible method of recovery is in the formation of cicatricial tissue, which incompletely replaces that destroyed.

Histologically speaking, the result is a permanently impaired joint, but not necessarily a lame one. With a continuation of the synovitis, the cartilages become cloudy, and the various structures of the joint secondarily involved. Up to this point, however, we have been dealing with a lesion which is truly a synovitis; beyond this we must use the term arthritis, as the whole joint is now implicated. A pure and simple synovitis is a rare disease, but as a primary change in arthritis it is quite common, and the first which is readily recognized.

Before taking up injuries involving all the structures of the joint, we will consider those wounds which primarily involve the synovial membrane only. The synovial sac may be opened by external injury, while the other structures of the joint are not invaded. The joint is punctured in some way, either in the form of an incised or punctured wound. These forms of injuries are probably more frequent in the lower animals than in human beings.

Immediately following the receipt of the injury there is but little hemorrhage, but from the wound a fluid like the white of an egg escapes. In a case like this you may be certain that a joint cavity has been opened, otherwise the synovia could not have escaped. In the smaller joints the escape of synovia is so small that it is often unnoticed. Where we meet such cases it requires considerable skill to determine whether or not the joint has been opened. When fully satisfied that the wound has punctured the synovial membrane, the following rules should at once and invariably be observed: the animal, and especially the limb, should be kept as quiet as possible, and the joint absolutely at rest. The day will probably come when plaster-of-Paris, or, better still, tripolith, can be effectually applied to the injured limbs of the lower animals as in man.

Tripolith is a comparatively new substance for surgical dressings, receiving its name on account of its hardness and great power of resistance. It was discovered or brought before the public by Mr. B. Von Schenke, of Heidelberg.

The advantages claimed for tripolith are: First, it absorbs moisture from the air less freely than plaster-of-Paris. Second, tripolith is lighter. An equal volume of plaster and tripolith were weighed;

the plaster weighed 604 grammes, tripolith 568 grammes. When dried the plaster weighed 470 grammes and the tripolith only 413 grammes. Thus, it will be seen that tripolith is about 14 per cent. lighter. Third, Tripolith hardens more quickly, plaster taking from fifteen minutes to one hour; the tripolith becomes perfectly set in five minutes. Fourth, tripolith when once hard remains unchanged by water, which enables a person, by preventing the entrance of water underneath the tripolith, to take the usual bath. Fifth, it is a trifle cheaper than plaster. If all the advantages claimed for this new material prove true, I see no reason why permanent and serviceable bandages cannot be applied to the lower animals as well as to man. In fact, I have heard of one case in which the hock joint was rendered immovable by plaster-of-Paris. The external wound should always be closed as quickly as possible, to prevent the escape of synovia, which has a great tendency to retard the healing of the wound and take away all chance of a primary union. There are a number of ways for doing this, the method to be governed by the size of the wound. The two principal ways, however, are to carefully shave off the hair immediately adjacent to the lips of the wound, and if the opening is small, cover it with flexible collodion; if large, a few interrupted sutures may be required; or, we can use both sutures and collodion. The essential thing, however, is to keep the joint perfectly quiet—immovable; and this can only be done by a well-applied plaster-of-Paris or tripolith bandage. If the patient has been highly fed prior to the receipt of the injury, we may find it advantageous to administer a mild purgative.

Some strongly advise the application of a few leeches, and at times you may be justified in so doing. Cold to parts, in the form of ice-bags, is sometimes of service. Some advocate warm applications.

In these wounds of the joints, I am convinced that by a well-applied bandage, rendering the joint perfectly immovable, far better results will be obtained than by any and all forms of antiphlogistic treatment. And the result will be many more speedy cures, and a much smaller number of permanently lame horses. In human surgery, the plaster-of-Paris method of treatment has wrought such wonderful results as to gain the title of very brilliant surgery, and it certainly will be doubly brilliant when made a success in the daily practice of every veterinarian.

About the third or fourth day after the receipt of the injury there is burning pain in the joint, slight fever, and we find the affected joint warmer than the opposite. On the fifth or sixth day remove your sutures, for they have done all the good they can and are now a source of irritation.

From this point the case may terminate in one of two ways.

First, and most favorably (which, however, is the most frequent, when treated in an immovable apparatus), is in a speedy recovery. The wound heals, perhaps, by first intention; the swelling, pain and heat have all subsided, so that at the end of three or four weeks, when the dressings are removed, you will find the joint movable, and a speedy recovery usually follows.

In the more unfavorable cases, the supposition is that the case does not come under treatment until some days, or it may be weeks, after the receipt of the injury. In such cases we find great swelling and heat in and around the joint, and the whole limb is often œdematous; there is severe pain when the limb is handled or moved; toward evening the temperature rises; the appetite fails, and the patient rapidly becomes emaciated.

Now, if you pay no attention to the limb, it will gradually become flexed, and if recovery follows, the patient may be totally unable to place the foot on the ground. There are various theories as to why the joint becomes flexed; First, that the irritation to the sympathetic or sensory nerves carries the stimuli to the origin of motor activity, and the flexors thus become most inflamed; second, that a joint will contain more fluid when semi-flexed. Another explanation, and one which seems most rational, is the simple fact that in a state of natural rest the joints are prone to fall into a flexed or semi-flexed condition, and again, when muscular activity is interfered with, it is most likely to be primary on the extensor side and not on the flexor. The flexor, therefore, being unimpaired, would tend to produce the semi-flexion.

When these symptoms of inflammation in the aggravated cases have developed, antiphlogistic remedies assume their historic value; but, above all things, the position of the limb must not be forgotten, for in case the joint should become stiff, or anchylosed, you want the limb in a position where it will be serviceable, which at best will be poor enough in the lower animals. You will remember, I

think, that we found that the tendency was for the limb to become semi-flexed, but in your practice, as in the lower extremity of man, if the joint is to become stiff, or anchylosed, the most favorable position would be that of extension or nearly straight. In the elbow joint of man, the flexed position is the one to be desired.

The best method of treatment for these severely inflamed joints is rest, cold applications and the local use of Tr. Iodin. Comp.

It sometimes happens that the fluid in the joint increases in quantity very rapidly, giving rise to insupportable tension when there is no free escape by the original wound, which fluid is quite purulent. At this point there is great danger from ulceration and breaking down of the capsule of the joint from within, and a flowing of the fluid into the surrounding cellular tissue, and a diffuse cellular inflammation.

To avoid this accident, we must puncture the joint either with a trochar or aspirating needle and draw off the fluid, always taking great care that no air enters the joint. Tapping of joint cavities has been repeatedly practiced in human surgery, and the disease found to terminate in a complete recovery, even at this stage. Since the use of the plaster-of-Paris splints, this extensive swelling, necessitating the tapping of the joint has been overcome in almost every case. There may be a complete recovery even after the synovial membrane has been ulcerated through, but generally there is more or less permanent stiffness of the joint.

This form of disease, however, frequently passes into a more chronic condition, the suppurating process attacking the tissues more deeply, but if recovery follows, there will always be more or less stiffness.

ART. X—SOME DISEASES OF GOATS.*

BY A. J. SEWELL, V.S.

I was of opinion, before I had the pleasure of being veterinary surgeon to this Society, that goats were seldom ill, consequently required very little medicine. I have now come to the conclusion that that was an erroneous opinion, for since being connected with

* A Paper read before the British Goat Society.

the Society I have taken great interest in the diseases affecting this animal, and I find they are very numerous. There is one disease in particular, several cases of which have recently come under my notice. The principal symptoms are continued diarrhœa, heavy breathing, and great emaciation, resulting in many cases in death from exhaustion. I propose to call your attention to this complaint further on. Until our secretary, Mr. Holmes-Pegler, brought out his valuable little handbook on goats, no other book, as far as I know, had ever appeared on the subject, and till very recently the goat was less known about than any other domesticated animal. There is no record of diseases and ailments of goats having been investigated; but perhaps this is from their complaints resembling those affecting sheep; in fact, there are very few diseases affecting the sheep which do not also affect the goat, and *vice versa.* Such diseases as contagious pleuro-pneumonia, cattle plague, foot-and-mouth disease, etc., goats are liable to become attacked with any of these affections as well as cattle, but, of the three, the goat is much less subject to them. This is probably the result of its hardiness; for no animal is more hardy than the goat, when living a natural wild life. Being now more artificially kept in stables and houses erected for the purpose, which, from being over-crowded, want of proper ventilation, and other bad sanitary arrangements, diseases of different kinds are becoming common. The disease I first mentioned, and which has been so fatal amongst the goats of several members, is the one I propose to draw your attention to first.

I do not consider the complaint contagious, though several goats of a flock are often affected at the same time. I think it is the result of some particular grass or condition of the grass on which they are fed. I have not noticed it more prevalent in wet weather than in dry, neither do kids seem to be more susceptible to it than adult goats, as in ordinary diarrhœa; in fact, most of the cases that have came under my notice have been in goats two or three years old. The following are some of the symptoms of the disease:

Scouring or Diarrhœa.—This is generally the first symptom noticed, but not always. In some instances it does not come on until the case is somewhat advanced. Then there is loss of appetite, which at first is only slight; but it lessens every day until, in bad cases, the goat refuses food entirely. There is great emaciation, the patient going al-

most to a skeleton, and looking, if I may so say, like a bag of bones. The breathing is often heavy and laborious, and sometimes offensive, making one think that the lungs were affected. Such, however, is not the case, as I have proved by many *post-mortem* examinations. A cough, as well as a discharge from the nose, is also at times present, but not usually, and only in one or two cases have I observed these two symptoms. The pulse is quick and weak, the conjunctional membranes, or, in plainer language, the internal surface of the eyelids, is pale and anæmic; the gums and inner surface of the lips are in a similar condition; and the tongue is white and furred. The animal stands with arched back, moving only when compelled. The diarrhœa in fatal cases is generally continous throughout the disease.

I will now read extracts from some letters from which I have received from members of the Society respecting the disease in question. One gentlemen, writing last month, says: "I am sorry to say I begin to doubt whether goats will thrive in our meadows, for the grass appears too rich and strong for them. Since writing you last, I have had the misfortune to lose my he-goat, in spite of every care and attention. This makes the second that has died within the last twelve months. I noticed for some weeks that he was gradually getting thin and wasting away. Diarrhœa set in and no treatment would stop it. His appetite was very bad Corn and meal of different kinds, and a variety of green food, were offered him, but he did not seem to care for any, and gradually pined away."

Another member writes: "I had four nannies, two or three kids, and a he-goat. This morning I found one of my nannies dead, and a day or two ago I found a kid dead. They had been suffering from diarrhœa." This writer does not mention any other symptoms, but I feel confident that it was the same disease. The gentleman then goes on to say that his "goats have a small paddock to run in during the day, and at night time they are brought into a house, where they receive hay and some corn, a mixture of maize, oats, and barley." This, you will all admit, is very good treatment for goats. One would have thought the corn—especially the maize and barley—would have counteracted any tendency to diarrhœa which the grass might have induced, but such

was not the case. The writer continues: "I lost two other goats in a similar way last year, and I cannot help thinking that goats will not do on our rich grass, but require mountainous places, where they can pick their own food". You see, gentlemen, that this writer is of a similar opinion to the previous one. He lost, altogether, from this complaint, five goats—one nanny, one he-goat, and three kids—and, I am sorry to say, was so disheartened by his misfortunes, and well he might be, that he thought of giving up goat keeping entirely. Our secretary, I am also sorry to say, has been equally unfortunate, as he has lost several valuable animals from the same complaint.

Treatment.—This is the most important part of all, for the disease is easily detected. Up to the present this has not been so satisfactory as one would have wished, for the large number of four out of every six cases generally prove fatal. Some goats succumb to the disease after a week's illness, others after a month's lingering sickness, and some cases last even longer than this. Having first warmly housed the patient, which is very necessary, a mild dose of purgative medicine should be given. I say a mild dose because the bowels, being in a relaxed condition, are more easily operated upon than if constipation was present. This medicine is given with the idea of removing any irritating matter that may be present in the intestines. Linseed oil or Epsom salts—it does not matter which one is given—will do. The dose of the oil for an adult goat of moderate size is from one and a half to two ounces; the dose of Epsom salts is about an ounce. This is best given in a little warm oatmeal gruel, the oatmeal assisting the action of the medicine. After the purgative medicine has had time to operate, astringents must be given. The following is what I have used with the best success, namely, powdered catechu, chalk, and gum, of each half a drachm; powdered ginger, one scruple; and powdered opium, six grains. This is one dose, and should be given in a little wheaten-flour gruel, and be repeated two or three times a day, according to the severity of the diarrhœa. As the diarrhœa lessens, the doses should be gradually decreased. It is a bad plan to discontinue the medicine directly the diarrhœa appears to have stopped, for a recurrence of it is often the result. The dose for kids (of the purgative medicine as well as the astringent) is from one-third to a half of that recommended for goats. When the diarrhœa is obstinate, I have given bark with very good

success. I have also given this medicine if the appetite is very bad after the diarrhœa-mixture has been discontinued, as it acts as an astringent as well as a good tonic. The dose is about thirty grains of the powdered yellow cinchona bark. This medicine is also best given in gruel. I have heard that port wine and cayenne pepper is a capital mixture for diarrhœa. I have never tried it, but should think it would act very well in mild cases. I saw a prescription for this complaint in *The Live Stock Journal* a few weeks ago. It was "linseed oil two tablespoonfuls, and turpentine one tablespoonful." It sounds rather warm. I should be afraid to give it myself, as I think it would probably increase the irritation of the bowels. Nitrate of silver I have used with very good results in bad cases. When the motions are accompanied with blood, constituting dysentery the dose is a grain and a half to two grains twice a day. It is best given as a pill or bolus made with bread crumbs. I know it is not usual to give a bolus to ruminating animals, but I have often given a small pill in cases like this with good effect.

Food.—As to the food, all green food should be withheld, but good meadow hay may be given, and a few oats mixed with barley meal may also be offered. When the patient will not eat, it should be drenched with good gruel made of wheaten flour. As to the quantity that may be given, half a pint three or four times a day is sufficient, for it is a bad plan to overload the stomach. If expense is not objected to, a wineglassful of port wine with each dose of gruel may be added with advantage.

Foot-Rot.—There is another troublesome disease that occasionally affects our goats, but it is not a fatal one—at any rate, seldom so. The complaint I mean is foot-rot. I saw a very bad case a few weeks ago. The subject was a good specimen of the Irish breed. The goat, which was a billy, when I first saw him, was unable to put the fore-feet to the ground, but was going about on his knees, which were becoming sore in consequence. The feet had been bad some weeks, and I am sorry to say little attention had been paid him, but I am glad to say that he is now all right. Foot-rot was once, and not very long ago, considered contagious, but it is now considered a non-contagious disease, and that its sole cause is the result of goats (sheep are more liable to it than goats) being kept on low wet ground. In this disease the horn becomes soft, cracks, and the crust turns inwards on the sole. Dirt and grit get between the cracks, and inflam-

mation of the sensitive laminæ, or quick, is the result, causing swelling and tenderness of the foot or feet, and lameness, which at first is only slight, but becomes, if the case is neglected, greatly increased. In these cases the cracks emit an offensive discharge, the coronet, or that part just above the hoof, becomes inflamed, swollen and sore, and the consequence is, an imperfect horn is produced. All four feet are liable to be affected, but the fore feet are more predisposed than the hind feet, probably from their having to bear more weight. Sometimes only one fore foot is bad, and at times only one digit of a foot.

Treatment.—When a goat is noticed to be lame, it should be caught and the foot examined. If affected with this disease, it should be well washed with warm water, to which a little Condy's Fluid should be added. All dirt must be removed, as well as all loose, broken, and diseased horn. This is best done with a sharp knife; a small one used by farriers, and called a "searcher," answers the purpose very well. Care must be taken when paring the horn not to draw blood. Hot linseed poultices should be applied to the affected feet for a couple of days. This helps to remove the soreness and imflammation. Then one of the following dressings should be smeared over the diseased parts daily: Sulphate of copper, 1 oz.; lard, 3 oz.; or carbolic acid, 1 dram; olive oil, 1 oz.

Sometimes ulcers and fungoid growths appear in the interdigital spaces. These may be carefully touched with the following strong tincture: Nitric acid and compound tincture of myrrh, of each 2 drams; and spirits of wine, 1 oz. Of course before commencing to treat a case of foot-rot, the patient should be removed to a dry place. This precaution is absolutely necesary. After the worst symptoms of the disease have passed, the following ointment, well rubbed into the hoof daily, stimulates the growth of horn, and keeps it soft and healthly. The ointment is composed of Stockholm tar, one part; and tallow, two parts. The last ingredient should be melted, and then the tar added, and well mixed by stirring. I hope at some future time to have the pleasure of bringing under your notice other diseases affecting the goat.

ART. XI.—THE PHYSIOLOGY OF DIGESTION IN RUMINANTS, WITH PRACTICAL REMARKS.*

BY HENRY C. SLEE.

The proverbial adaptability of nature to existing needs and circumstances is most beautifully illustrated in the digestive organs of ruminants. These creatures are naturally handicapped in the struggle for existence. Their food contains but a small amount of nourishment in a large matrix of waste material, requiring an immense amount of preparation before the nutritious portions can be absorbed. But by the wonderful formation of their digestive organs, they overcome this difficulty, and thrive and fatten where the unfortunate possessors of less complex organs could hardly subsist; hence we find them existing in all parts of the world, except New Holland and some of the South Sea Islands—braving alike the snows of Greenland and the lightning of the Alps; the thirsty deserts of the East and the dizzy peaks of the Cordilleras—and we find them in countless numbers on the luxuriant plains of Africa and America.

The substances from which this digestive machine can extract nutrition are astonishing. The reindeer grows fat on the moss which he finds underneath the snow, and for which he digs with his antlers—naturally he never eats grass or hay; the elk lives principally upon heather, reeds and twigs, and will nip off clean, with his lips, and swallow and *digest*, a twig that would almost serve for a riding whip; the goat will luxuriate in a diet of poisonous hemlock and aconite; and the average diet of the camel is so dry and hard that if he were provided with green spectacles and fed on shavings he would scarcely detect the fraud.

THE ORGANS OF PREHENSION.

The organs of prehension vary somewhat in ruminants. In some, as in the cow, the lips, though strong, are not sufficiently movable to be of any use in prehension, while the tongue is so long and the muscles by which it is moved so powerful that it is the principal organ used in this process, like the lips in the horse. In the giraffe the tongue is generally about eighteen inches long. In some other rumi-

* From notes of lectures on Physiology delivered by Prof. C. L. Dana, M.D., before the Columbia Veterinary College and School of Comparative Medicine.

nants, as the sheep and goat, the tongue is even smaller proportionately than that of the horse, while the lips in these animals are very thin and movable, and are the principal organs of prehension. The upper lip of the sheep, camel, llama, deer and others is divided in front, enabling them to move either side independently of the other. The lips of the giraffe aud elk are very extensible, and those of the latter have fleshy appendages almost like a set of muscular teeth.

The interior of the cheeks of ruminants, are provided with large papillæ, which in the elk are of very large and in the camel have much the appearance and size of wooden shoepegs.

The teeth of ruminants are less in number than those of the horse, being generally thirty-two, and, with the exception of the camel and the llama, they have no upper incisors, these being replaced by a cartilaginous pad. The lower incisors are sometimes fixed in the jaw in such a manner as to admit of a slight amount of motion, and thus graduate the pressure upon the pad—a condition often mistaken by novices for disease. The molars are the same in number as those of the horse, but differently proportioned in size and the shape of their grinding surfaces. With the exception of the camel and the llama and a few species of deer, the ruminants have no canine teeth. The camel is the only one that possesses such teeth in the lower jaw. During fœtal life the ruminants often possess incisor teeth which never cut through.

THE SALIVARY GLANDS

are large in ruminants—the parotid is large in all; but the others vary in their relative proportions in different species. The sub-maxillary is the most prominent in the cow. These glands secrete a large amount of fluid, but it contains, as a rule, no diastase like the saliva of man, the horse, etc.

The camel is provided with what might almost be called an extra tongue, in the shape of a flap attached to the front of the soft palate, sometimes nearly a foot long, reaching down into the œsophagus. It can be protruded from the mouth like the tongue, with a peculiar noise. It secretes a watery fluid, catches water regurgitated from the reticulum, and moves over the tongue and pharynx, bathing them and relieving thirst.

A very prominent peculiarity of the digestive organs in ruminants is their proportional distribution. In them, the food is subjected to elaborate preparation and is pretty thoroughly digested before it

reaches the small intestines, and the intestines are chiefly devoted to absorption; unlike the solipeds, in which there is little such preparation, and in which digestion is mainly carried on in the intestines. Hence we find in ruminants immense receptacles for the food, anterior to the intestines. While the horse's stomach will contain about fifteen quarts and his intestines two hundred quarts, the cow's "four stomachs" will contain nearly two hundred quarts and her intestines only eighty, viz.:

Rumen	140	quarts.
Reticulum	4	"
Psalter	52	"
Abomasus	20	"
Small intestine	50	"
Large intestine	30	"

The Rumen, or paunch, is considerably larger than the other stomachs—that of the cow being large enough to contain over one hundred quarts; that of the goat, twenty to twenty-five quarts, and that of the sheep, twenty-five to thirty quarts—and occupies about three-quarters of the abdominal cavity, in which it is situated somewhat obliquely, touching the left abdominal wall at the flank. It is divided into two almost complete sacs by a strong muscular ridge, which commences at the left side of the cardiac orifice, and extends the full length of the sac. Each division is again subdivided. In the camel, this ridge sends out fibres at right angles, and these fibres are again connected by other sets of fibres, which form a series of cells for the retention of water. These are partially closed by a continuation of the lining membrane, leaving a small circular opening in the centre of each. In the full-grown dromedary the largest of these cells, when dilated, have a depth and width of three inches.

The mucous membrane lining the rumen has no mucous glands, but is covered by a particularly hard, firm pavement epitheleum, and in horned ruminants is covered with tufts, projecting from the surface, which vary in shape and size in different portions of the sac, being smallest near the muscular ridges. Their appearance is familiar in tripe. They vary in size in different species of ruminants, being larger in wild ruminants than in those which have been domesticated for ages, reaching the most extraordinary development in the

gazelle, but being entirely absent in the camel. In the cow they vary in different portions of the rumen, some tapering almost to a point, and notched on the edges like an oak leaf. In the sheep and goat they are longer than in the cow, and their free margins are thin and spread out. In the bison they are large and coarse; in the reindeer and giraffe they grow larger as they rise from the surface; and in the reindeer they are interlaced. These variations are no doubt made to accord with the peculiar food of the animal.

The muscular walls of the paunch are composed of striated fibres, showing that their movements are under the control of the will—a remarkable deviation from the rule in animal creation—the muscles which control organic life being, in almost all other cases, non-striated.

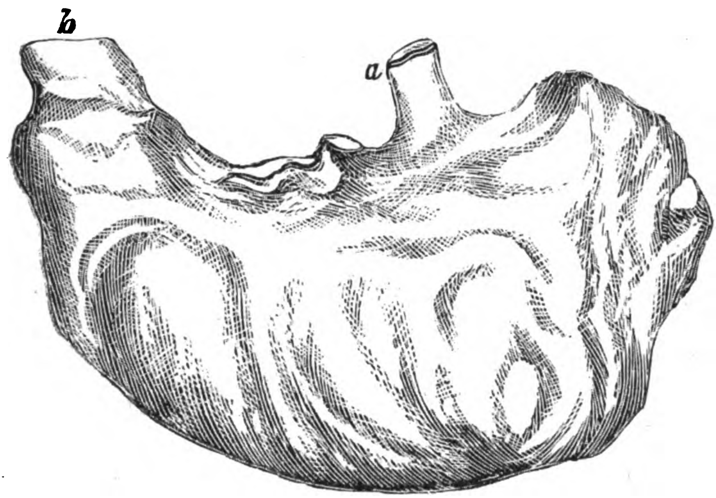
The *second stomach*, or reticulum, is the smallest in the cow and in most other ruminants, and appears like a division of the rumen, from which it is separated by a thick muscular wall, in which is left a very large aperture. This aperture, is closed by a kind of valve, which allows the food to pass from the rumen into the recticulum, but prevents its return. The muscular walls of the reticulum are very powerful, and the mucous membrane lining it is folded in such a manner as to form narrow pits or crypts, giving it an appearance from which the names reticulum or honeycomb (by both of which it is known) are derived. The walls of these pits contain muscular fibres, so arranged that, by the contraction of one set, the pits will retain the water with which they become filled, and by the contraction of another set the pits are opened and their contents let out to moisten the food. This structure is most prominent in the camel, in which the reticulum is called the "water bag," and their subdivision into small cells is more minute than in the cells of the rumen. Their development varies in different species of ruminants, apparently in proportion to their need of water. In the cow, they are subdivided almost like those in the camel; but in the goat the subdivision is less marked. In the reindeer, which swallows a good deal of snow with its food, they are very shallow; and in the giraffe, which feeds principally on young leaves and buds, which contain a good deal of moisture, they are merely represented by raised lines—still, however, retaining the same uniform manner of division. In the musk deer—a rather curious, half-developed ruminant—the reticulum is barely

recognizable, being scarcely divided from the rumen, and devoid of cells.

It is in the recticulum that the indigestible bodies so often swallowed by ruminants are generally lodged, and here and in the rumen the masses are formed which cause so much annoyance to stock-raisers. Similar formations are sometimes found in the intestines of the horse, and in both animals they are generally composed of a tribasic phosphate of ammonia and magnesia. Analysis of some has shown them to contain: phosphates, 80 per cent.; calcium, 5 per cent.; water, 15 per cent. In ruminants the nucleus of the mass is generally hair, with an accumulation of the above salts about it. These may be produced by feeding upon rye bran, which is rich in phosphates and magnesia. It is not very long since similar "stones" found in the intestines of the antelope, and known under the name of bezoar, were hawked through Europe as a general panacea for all diseases, increasing in value with their size, one weighing four ounces having brought the sum of $1,000.

The *third stomach*, which has been given many names, the most preferable of which seems the "psalter" (derived from the peculiar book-like folds of its lining membrane), is a wonderful piece of mechanism. These folds commence at the end where the œsophagus enters and run lengthwise the full length of the sac, the longest terminating at the aperture connecting this with the fourth stomach. On each side of every large leaf is another one-half as wide, and besides these, again, third leaves one-half the width of the last; and finally, between each set of folds, a distinct elevation of the membrane, as though still another fold had begun to be formed. The faces of these leaves are studded with small, hard nodules, thus forming a most perfect triturating apparatus, as there are muscular fibres running in the leaves by which they are moved and the food slowly rubbed together. These folds are generally fifteen in number, the largest of them wide enough in some ruminants to stretch half way across the sac. In the cow these folds are considerably developed, but in the camel they are merely rudimentary. The purpose of this we will see later on.

In the sheep and goat this stomach is smaller than the recticulum; in the camel it is very long; and in the musk deer it is scarcely divided from the fourth stomach, of which it seems a part.



STOMACH OF RABBIT, ACTUAL SIZE.

a Cardiac opening. *b* Pyloric opening.

The *fourth, or digesting* stomach, called the abomasus, is second in size to the paunch, and considerably more cylindrical in shape than that of the horse. It presents less variations than the other stomachs. In the cow and most other ruminants, its whole mucous lining is covered with glands which secrete gastric juice. In this respect it approaches more nearly that of the carnivora than does that of the horse, in whose stomach the gastric follicles cover not much more than half the surface. In the camel, however, this stomach is very small, compared with that of the cow, and the gastric surface is also less, being confined to the posterior two-thirds. The pyloric orifice is provided with a peculiar valve in the shape of a powerful muscle; but it is not tight, as in the horse.

We have left the consideration of the *œsophagus* until now, because, if not the most wonderful, it is the most complicated portion, and requires some knowledge of the stomachs to appreciate its mechanism. It is extremely dilatable throughout its whole extent, and is considerably wider, proportionally, than that of non-ruminating herbivora, more nearly resembling, in these respects, the œsophagus of the carnivora. It terminates in a funnel-shaped enlargement at its en-

trance into the rumen. The layers of the muscular coat maintain their regularity throughout the whole length, and do not terminate in white fibres, as in that of the horse, but are all voluntary: hence, its dilatability is the same throughout. The œsophagus does not terminate with its entrance into the rumen, but continues along the superior portion of the reticulum, and terminates at the orifice between the reticulum and the psalter. This continuation is in the form of a partly-inverted gutter or trough, the open side of which presents to the left and downwards. The edges, or lips, of this gutter are muscular, and rise gradually from their origin, where the œsophagus enters the rumen, until, at their termination, or entrance into the third stomach, they form a thick, powerful, almost perfect ring, but never quite a ring, the edges never being attached to one another, but always separable, except in infancy. This channel, in the camel, is enlarged into a small sac between the reticulum and psalter, which is believed by some to be the true reticulum. The orifice between this sac and the psalter is small, and, as in other ruminants, can be closed. This sac may have given rise to the assertion, so often made, that the camel has a fifth stomach or extra "water bag," which is now well known to be untrue.

In young calves, the first and second stomach are very small, being only gradually developed after weaning; and the orifices leading into them from the œsophagus are closed, the lips of this gutter adhering so as to form a tube leading directly into the third stomach; hence sucking calves do not ruminate.

The proportional capacity of the

INTESTINES OF RUMINANTS

and solipeds has been referred to. In ruminants they are small in calibre, though very long. The small intestine of a cow is $\frac{3}{4}$ to 1 inch in diameter; of a horse, 1 to $1\frac{1}{2}$ inches, and the colon of the cow is only $1\frac{1}{2}$ to $1\frac{3}{4}$ inches in diameter. The length is as follows:

	Horse.	Cow.	Sheep.	Goat.
Average length of small intestine (feet)	70	115	70	70
Large intestine (feet). . . .	16	35	20	25
Proportion to length of body	1–12	1 to 18 or 20	1 to 26 or 28	1 to 26 or 28
Superficial area (square yards).	15.5	15	Pig 3	Dog 5

The small intestine, at its commencement, is considerably enlarged in all ruminants; and in the camel this enlargement is very prominent, forming a sac half as large as the abomasum. In some fœtal ruminants the small intestine is of large calibre, bearing the same proportion as that of the horse.

The cæcum is smaller than in the horse and not puckered, except in the buffalo, in which it is bifid at the end.

The colon is not divisible into double and floating colons as in the horse, and is longest and smallest, and the coils most regular in those which expel the fæces in small pellets, as the goat.

(*To be continued.*)

ART. XII.—THE TEETH OF THE HORSE, AND THEIR DISEASES.

BY R. JENNINGS, V.S.

I have chosen this subject, believing it may possess sufficient interest to render it acceptable to many readers who may be interested in equine stock, and for the purpose of putting upon record a few facts, the result of my own experience and investigation, and which appear to have been overlooked or ignored by veterinary writers. My will is good, but I feel myself incompetent to do this subject the justice which I believe it fully merits. I shall, however, attempt to show a few practical points which, to me, seem of importance to the veterinary student, believing that my theory will bear the closest scrutiny, and receive the endorsement of honest investigation. Dentition belonging to the class mammalia is the most important division of the digestive apparatus, which, as a whole, is the most complete of the several organs into which the animal frame is divided, and upon which we are dependent for existence. The digestive organs in the biped and the quadruped are varied, in order to adapt each to its natural instincts, and the teeth to assume different forms in different species of animals. The order and precision with which this has been effected enables the comparative anatomist, from the inspection of a single tooth, to describe the habits and peculiarities of the animal

to which it belonged, whether carnivorous or herbivorous. This admirable arrangement of the teeth enables the animal to gather its food and convert substances quite different in their structure into material which nourish and build up the animal frame. The consideration of the embryotic formation of the teeth I do not consider of sufficient importance, in connection with this subject, for encroaching upon your valuable space; will therefore pass on to the consideration of the several divisions of the teeth, and the order in which they make their appearance in the mouth during the process of dentition. In the mature horse, we find forty teeth, namely, twelve incisors, or nippers, situated in the anterior portion of the mouth, six in the upper and six in the lower jaw. Their use is to seize their food, cut and take it into the mouth, where it undergoes the process of trituration by the grinding of the molar teeth, which are twenty-four in number; twelve in each jaw, and situated on either side of the face. The cuspidati, canine teeth or tushes, are four in number, and situated two in each jaw, between the incisor and molar teeth. The colt, during the natural process of dentition, cuts and sheds off twenty-six teeth, viz.: Twelve incisor teeth, arranged as in the adult horse, the receptacle for which is the alveolus of the anterior superior maxillary bones, which are divided by nature at the median line. Twelve molar teeth are alike situated in the posterior superior maxillary bones, which give shape and solidity to the cheeks. This arrangement differs from the anatomical divisions of the bones of the face in the human being, inasmuch as there are four superior maxillary bones in the equine animal, while in man there are but two. These bones in both species of animals largely make up the anterior and lateral portions of the face. The foal, at birth, usually has all the temporary molar teeth, and four of the incisors, which are the central pairs, one pair in the upper and one in the lower jaw. During the second month, the second pair of incisor teeth make their appearance, one in the upper and one in the lower jaw, on either side of the first or central pairs. About the eighth month of the animal's life, the third and last pairs make their appearance, one above and one below, on either side of the second pairs; these complete the set of incisors. The wolf teeth make their appearance between the first and second year, and are situated immediately anterior to the first molar teeth of the upper jaw, on either side. At the age of two years, the deciduous teeth are fully developed, the colt having a full

mouth. Mayhew says: "The wolf's teeth at the anterior of the two rows of upper molars are generally present or indicated at birth; but, as they are not invariably found, no distinct notice need be taken of their existence." This opinion evidently is not based upon personal experience or investigation, but is the result of casual observation only. From the year 1859 to 1867, I had the medical charge of the brood farm of Adolph Malliard, Esq., Bordentown, New Jersey. Upon this farm an average of more than two hundred blooded animals were constantly kept, which afforded me many opportunities for investigation, all of which I improved. In every instance, where the foal was lost in parturition, natural or premature (by premature I do not mean abortion), I examined the jaw-bones of the foal, and in every instance found the alveolus of the wolf teeth distinct and filled with the pulp of the future teeth. But in no case did I find these teeth developed. Various are the theories which have from time to time been advanced regarding these teeth, arising, for the most part, from want of proper investigation and the assertions of writers founded upon theories born in their versatile imagination, which the following will fully prove: "Every Man his own Farrier," page 201: "This is a small tooth appearing on the upper jaw, at a distance of about half an inch from the grinders, sometimes on one side and at other times on both sides. These teeth are seldom found in young horses, but old horses are sometimes subject to them. They are supposed to affect the eyes at different times; they must be removed either by application of a hammer and chisel made for the purpose, or by filing them down level with the gums." The author of the above places these teeth in a new position. This reminds me of one J. Z. Walling, a veterinary dentist, who, in a communication published in an agricultural paper, says: "The horse cuts the canine teeth at the age of five years, and sheds them about the eleventh year." Comment is unnecessary. It is quite evident that in the days of Gibson, Bracken, Bartlett and other writers of their day, that these teeth had not been noticed, as the following quotation will fully prove: "Wolves' Teeth.—A horse is said to have wolves' teeth when the teeth grow in such a manner that their points prick or wound either the tongue or gums in eating. Old horses are most liable to this infirmity, and whose upper teeth overshoot the under ones in a great degree. To remedy this evil you may either chop off the superfluous parts of the teeth with a chisel and mallet, or file

them down, which is the better way" The condition of the teeth here referred to will come under our notice as we proceed. But to return to our subject. These teeth are natural to all colts, and are developed in the same manner as the other teeth; yet few veterinary authors regard them of sufficient importance to mention them in their works. The germs of these teeth are found in the foal at birth, developed in the jaws of the yearling, ready to make their way through the gums, and do appear in the mouth of all colts at some period between the first and the third year of its age. They will be found in a large majority of colts at the age of two years. In the examination of more than one hundred colts' jaws, during an active practice of thirty-seven years, which have died under two years of age, not a single instance occurred where these teeth, or the germs which produce them, were not found; proving, beyond a doubt, their existence as natural teeth belonging to the class deciduous.

(*To be continued.*)

ART. XIII.—BREEDING OF ELEPHANTS IN CAPTIVITY.

BY GEORGE ARSTINGSTALL,

Elephant Trainer for Barnum, Bailey and Hutchinson.

The breeding of elephants in captivity is not very common. Elephants bred in captivity are spoken of by Œlian even in the days of ancient Rome; but from that day to this it has been a rare occurrence, even in India and Ceylon. In Ava, however, it is quite a common thing, as the elephants are there allowed to live in a semi-wild state.

Their mode of copulating is a subject which has excited considerable interest; also the age of maturity or period when they are capable of breeding.

It has generally been stated that the elephant is exceedingly modest, even more so than man; this, however, appears to be an erroneous

statement. The only clear reason why they are not anxious to perform the act is that they are kept upon such low diet to keep them under control that they are, in reality, in a weak and debilitated condition, and their passions not easily aroused. When highly fed, however, they give every evidence of a strong desire to copulate, and when the female is in heat the power of man is utterly unable to restrain them.

The observations of Mr. Corse, who had a large number of elephants under his charge, was that they would copulate even when at work, in spite of all their drivers could do.

The record of his observations seem to be very accurate. First, he gives the record of an elephant born October 16th, 1789, which was a male, thirty-five inches high. The first year it increased in height eleven inches, measuring forty-six inches in height; the second year it gained only eight inches; the third, six inches; fourth, five inches; fifth, five inches; sixth, three and one-half inches; seventh, two and one-half inches, at that time measuring six feet and four inches in total height.

The males grow more rapidly than the females; but in one young female, which became pregnant at the age of sixteen years, in which actual measurements were recorded for five years previous to conception, the animal gained only six inches; but during the twenty-one months of her first pregnancy she gained five inches in height. Seven months later she again became pregnant, but during the second pregnancy gained only one-half inch. From this we must infer that the females gain slowly during their early years, but when they become pregnant at an early age rapidly increase in size.

Mr. Corse was inclined to think that the females became pregnant from the fifteenth year on, and that females, under natural circumstances, were fully matured by the nineteenth year.

Further than this, he had an opportunity of knowing accurately the days of copulation, and had the pleasure of following the case up to the day of delivery, the history of which is as follows: The bull elephant had connection with the female twice on the 28th and twice on the 29th of June, 1793, the four connections being within sixteen hours. The manner of copulation and the time occupied was the same as is commonly observed in the horse. Three months after connection the breasts began to enlarge, and continued gradually to increase until a few weeks before delivery, when their enlargement

was more rapid. On March 16, 1795, she gave birth to a male, which measured thirty-five and one-half inches in height. This would fix the term of pregnancy at twenty months and eighteen or nineteen days. The infant sucked the milk from the breast with the mouth, often encircling the mammæ with its trunk, apparently to increase the flow.

In the early part of the following September, 1795, the animal was in heat, and readily took the male. At the end of a few days the female positively refused to take the male; and when he attempted to undertake liberties, he was treated to a kick in the face, and all attempts at copulation were stopped. As he left the station before she gave birth to the second elephant, he could not state positively the duration of the second gestation.

The signs of heat he states to be a slight swelling and congestion of the vulva, which also descended to a slight degree.

The measurements of the penis were given at two feet four inches to two feet six inches, and from fourteen to sixteen inches in circumference.

The reason given for their not breeding in captivity is that they are commonly kept on such low diet to render them docile and under perfect control; but as soon as they are highly fed, it is almost impossible to keep them from copulating and breeding.

Another interesting fact in connection with the elephant is that they are subject to a great variety of diseases. In India it is said that about fifty per cent. die within the first year of their captivity.

Again, he states that they often captured the female when carrying their young, and that the young, under such circumstances, are always smaller than those born in captivity, by some four or five inches. This fact, however, is ascribed to the depressing influence which the animals are subjected to gain perfect control over them.

The breeding of elephants in this country, however, is of the most recent date, and the only two have come under my personal observation, the first one being born at Philadelphia, Penn., on March 10th, 1880; the second at P. T. Barnum's Bridgeport winter quarters, at 8.10 o'clock P. M., February 2d, 1882.

Close observations were taken of the act of copulation, during pregnancy, and of the delivery.

The mother of the second is named Queen, and is between twenty-eight and thirty years of age.

The period of gestation was not quite as accurately determined as the one above quoted, as the bull was allowed access to her for several weeks, but dating from last known connection to the day of delivery, makes the period of gestation a few days less than twenty months. Conception may have followed the first act, which would increase the time a little.

For the first few months the animal appeared as usual, but as she advanced toward full term she grew heavy and sluggish until the last month, when she became decidedly lazy.

One of the earliest symptoms noted was the enlargement of the mammaæ, which in the elephant resemble the human both in general outline and position, being in the pectoral region.

From the fourth month the mammæ were quite prominent, but developed slowly until the last few weeks, when they rapidly gained in size until they were about as large as those of an ordinary Durham cow. As near as could be determined, each organ would measure from six to eight inches from base to point of nipple, and at the base about twenty-four inches in circumference.

Each nipple was covered until the day of delivery with a scaly coating.

On the morning of February 2, 1882, the animal appeared about as usual, but during the forenoon the scaly crusts over the nipples peeled off, and a watery mucous discharge was noticed coming from the numerous openings in each. Close observation revealed the fact that each nipple, instead of having a single or common opening, had several, the right eleven, and the left thirteen. About two hours before delivery there was a slight watery discharge from the vagina, and it was plain that the lips of the vulva were swollen, the vessels distended with blood, which appeared as so many blue lines.

When these symptoms were first noticed, the Queen was separated from the rest of the elephants, placed in a room by herself and securely fastened. She kept on eating, and seemed perfectly well until twenty minutes before the baby was born. From that time until birth she appeared a trifle uneasy, but gave no evidence of positive labor pains.

The delivery was very sudden, and occurred while she was standing, having previouly separated the posterior extremities to a slight degree.

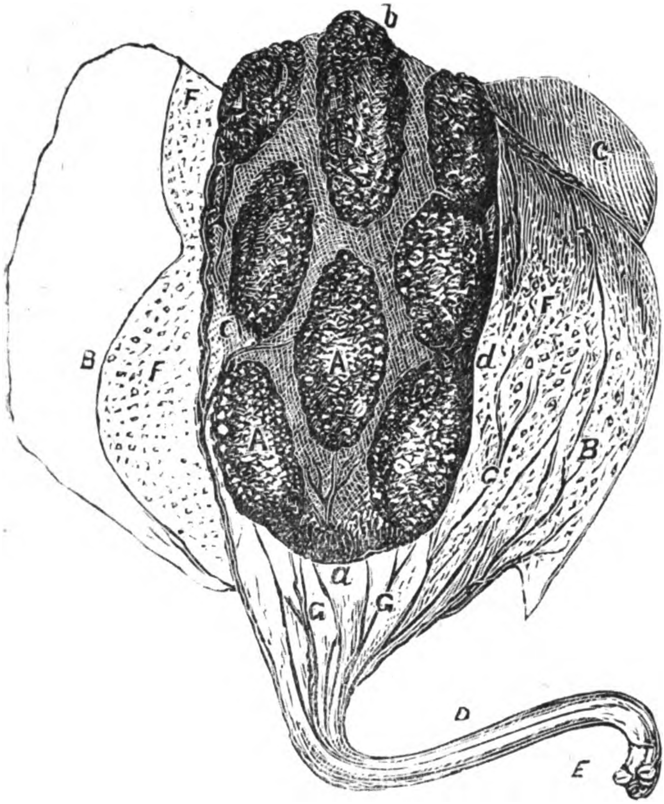
The baby presented head and feet first, enclosed in its membranes, and appeared to be going up and out of the rectum, which appearance was accounted for by its passage over the pubic arch, and in less than three minutes had dropped to the ground. The mother instantly straightened up, crossed her posterior extremities, and by rubbing them together soon severed the cord. The little one lay perfectly quiet and apparently was not breathing, but the mother, as soon as the cord was broken, turned round, and with one of her anterior feet, struck the membranous sac quite forcibly, which instantly broke with a loud report. After rupturing the membranes, she placed her foot on the thorax, and pressed it with the appearance of considerable force, raised it and pressed again, and repeated this operation several times, until the little one began to breathe and gave positive evidence of life, when she ceased and appeared satisfied. Now, for the first time she was considerably excited. This stage of excitement lasted for about one-half hour. About this time the baby made several attempts to gain his feet, and finally succeeded, but was quite weak on his legs for a number of hours.

The mother gave every evidence of suffering more pain after the delivery and until the placenta was discharged, than in giving birth to the baby. There was a low beam near by, which she got astride of and settled down upon quite heavily until the after-birth was discharged, which occurred two hours after the fœtus. This was accompanied by a slight discharge of blood; the animal stepped back from over the beam, and appeared perfectly relieved.

Five hours after birth, the baby walked up to the mother, turned the trunk up over its head, and commenced nursing.

Two hours after delivery the baby was weighed, and turned the scale at one hundred and forty-five pounds, and measured thirty inches in height. The little one was of a light mouse-gray color, and has rapidly grown active and playful.

The milk soon became quite abundant, is nearly the same in color as that of the cow, but very sweet in taste, closely resembling that of the cocoanut milk. The quantity secreted daily is rather more than in the cow, and previous analyses have proven that it is much richer. The quantity of cream, as compared with the best Jersey cow that could be obtained, was found to be one-eighth greater in bulk.



DESCRIPTION OF ELEPHANT'S PLACENTA.

Oval in shape; longest diameter, from *a* to *b*, thirty-eight inches; shortest diameter, from *c* to *d*, twenty-two inches. *A*, placental tufts. *B*, endochorion. *C*, exochorion. *D*, umbilical cord. *E*, end of cord, showing cut extremity of vessels and encircling sheath. *F*, numerous cotyledons on the fan-shaped expansion of the chorion--in all about five hundred. *G*, vessels of the placental membranes.

An elaborate written description of the placenta is hardly necessary in connection with this case, as the above cut, with its explanatory notes, brings out clearly all the points of special interest.

A full account of the placenta taken from the elephant delivered in Philadelphia was reported upon by Henry C. Chapman, M.D., in the last volume of the Journal of the Academy of Sciences of Philadelphia, for the year of 1880.

The cord from the Bridgeport, Ct., case appeared like a large rope, and was formed by two arteries and one vein, and a remnant of the allantois, which were enclosed in a common sheath of dense fibrillated connective tissue substance. There was a small amount of adipose tissue surrounding the vessels and separating them from their ensheathing membrane.

The folds of the chorion were thickly studded with oval bodies which, in their gross appearance, closely resembled lymphatic glands. These structures were undoubtedly cotyledons, and numbered about five hundred in all. Two hundred were found to be located in the exochorion, and about the same number in the endochorion.

Microscopic sections of the vessels and cotyledons were prepared at the School of Histology and Pathology in connection with the Columbia Veterinary College, by William H. Porter, M.D., and Mr. William G. Le Boutillier, who found the following appearances: "The vessel, or umbilical vein, had its lumen nearly closed, which resembled in outline a small stellate opening. The tissue forming the wall of the vein was composed of non-striated muscle, white-fibrous and yellow-elastic tissue, arranged in concentric layers. The white-fibrous and elastic formed alternating layers, the latter being thin in comparison with the former, but at the same time very distinct. The muscular coat was thin and irregular. The endothelial layer not as well marked, although apparent.

"The two arteries also presented the star-shaped lumen, but their walls were made up principally of longitudinal and circular bands of smooth muscle fibres, the former predominating. These muscles were remarkably well developed.

"There was a thin external coat of white-fibrous and yellow-elastic tissue. There was also an imperfect tunica intima.

"Sections of the cotyledons showed that they were chiefly composed of mucous tissue containing numerous small thin-walled blood vessels, and all forms of connective tissue corpuscles, also a few involuntary muscle cells. The portions just within the circumference were more highly vascular, and were composed of a more dense or of a true fibrillated connective tissue substance. In the harder portions the blood vessels were less abundant and more perfectly formed. Around the outer edge of the section, or what would strictly represent the external layer or limiting membrane, there was a number of papillary projections composed of perfectly formed round and oval nucle-

ated corpuscles, which would lead one to suppose that these nodules were covered in part at least by a layer of one or more very distinct cell elements."

See S. de Priezæ Hist. des Elephants, Paris, 1850.
Petrus ab Hartenfels, Elephant Tographia Curiosa, 17, 15.
Browning; Siam, its Kingdom and People, vol. 1, p. 219.
Livingston's Travels. Passim.
Philosophical Transactions of Royal Society, London, 1799.
Journal of Academy of Sciences, Philadelphia, 1880.

EDITORIAL DEPARTMENT.

TUBERCULOSIS IN THE CENTRAL ORGANS OF THE NERVOUS SYSTEM IN COWS.

DR. FR. ENGEL, a veterinary surgeon of Weingarten, has reported several cases of tuberculosis of the brain and cord in cows.

They are of especial interest, because they illustrate very well some of the symptoms of disease of these centres; and, furthermore, they are important because they help to prove the identity of human and bovine tuberculosis.

The first case was that of a cow eight months pregnant with her first calf. The first thing noted was that the head was held up sharply. A few weeks later, the hind legs became stiff; she then was unable to stand. The hind legs becoming completely paralyzed. The lungs seemed normal; so were also the digestive organs. Pulse, 68; temperature, 39.2° C.; respiration, 28. The right eye was somewhat wider open.

The diagnosis of tuberculosis was made, and the animal killed. The entire course of the acute symptoms had been about a fortnight. The post-mortem examination showed a tubercular inflammation of the meningitis at the base of the brain and in the anterior third of the longitudinal fissure. The tubercles were mostly gray, transparent, and the size of a pin's head. Some were, however, yellow, and of the size of a pea. In this latter respect only does the description of the appearance differ from that of the ordinary vasilor meningitis in man. The lumbar part of the spinal cord was the only portion examined. It showed also considerable tubercular meningitis.

We will not give the history of the remaining three cases (reported in the *Wochenschrift für Thierheilkunde und Viehzucht*).

It may be a help to our readers, however, to know the principal symptoms developed.

In all cases the head is held high up, and in some cases twisted to

one side. The eyes have a changed appearance. They are either staring or else are directed forward, or there is some form of strabismus. Often the pupils are unequal. The limbs become stiff. The hind legs may be paralyzed, or the animal falls down, and remains on its side, with stiffened extremities.

Generally the lungs are affected at the same time, and this fact will greatly help the diagnosis.

There may, perhaps, be a few tubercles in the meninges of the brain or cord for months; but the disease is essentially an acute one, just as it is in human beings.

That the tubercles are the true tubercles of bovine tuberculosis is shown by their developing, in some cases, directly on the dura mater of the brain in the form of little pedunculated tumors; so that the German name of "pearl-disease" applies to it still when situated in this region. They also show a tendency to calcify, peculiar to the pearl-disease.

We hope to have some descriptions of these cases from our readers in this country. Bovine tuberculosis is by no means rare; but doubtless the cases in which the central nervous organs are affected are generally overlooked.

The Diseases to which the Domestic Animals are most Subject.—Some interesting facts in regard to the diseases from which the domestic animals suffer most are given by Dr. A. Lydtin, in his report as Superintendent of Veterinary State Medicine, in the Grand Duchy of Baden.

There were treated in the year 1881, in this Duchy, 22,000 animals. The per cent. of cases treated were as follows: Cattle, 54; horses, 37; sheep, 3; dogs, 3; swine, 2; goats, 1.

The kinds of diseases from which these animals suffered were, in one hundred cases, as follows: Digestive organs, 29 per cent.; respiratory organs, 13 per cent.; constitutional diseases (fevers, etc.), 13 per cent.; surgical operations (for injuries, but chiefly castrations), 13 per cent.; external diseases (skin, etc.), 12 per cent.; diseases of the organs of locomotion (rheumatism, lameness, etc.), 10 per cent.; diseases of the nervous system, 3 per cent.; diseases of the kidneys, 2 per cent.; parasitic diseases, 2 per cent.; localized disease 1 per cent.; circulatory diseases, 1 per cent.; infectious diseases, 1 per cent.

This list shows a comparatively small proportion of diseases among

horses for which treatment is required. Also, a much smaller number of cases of lameness than would be found in large cities. The proportion given, however, will probably hold good for the country and large towns, where there is no epidemic disease of any kind.

The animals were treated by 106 veterinary surgeons, making an average of over two hundred cases for each practitioner.

VETERINARY SURGICAL NOTES.—Among German veterinarians the use of a red-hot iron in diseases of the joints and of bones has had very happy results. Dr. Utz recommends highly the use of the needle in the colic of horses. The rumen of cows, according to Gotz, should not be punctured when the animal is advanced in pregnancy. Dropsy of the scrotal sac in oxen is very radically cured by simply cutting off the scrotum. Broken legs in calves can be cured, according to Ow, by the use of plaster-of-Paris, or by a simple clay bandage. A cure for cancer in the lower animals is said to be the application of oil of turpentine to the affected surface; this being covered with oakum and firmly held down by a bandage.

SOME CURIOUS THINGS THAT HAPPEN TO OUR DOMESTIC ANIMALS. —We collect, through Dr. A. Lydtin, the following interesting notes from the contributions of various German veterinary surgeons.

Many of the cases are instructive, as showing our readers the possible mishaps which they may be summoned to remedy:

Chronic Vomiting in an Ox.—A fifteen-months-old ox vomited regularly its food. Being put on a bran-mash, it stopped; but began again with a return to hay. *Post mortem* showed a diverticulum in the œsophagus the size of a child's head, filled with dry hay and straw.

A Similar Diverticulum, with almost complete stenosis of the cardia, was found in an old cow which had also suffered from chronic vomiting.

Stenosis of the Œsophagus in a horse was brought about by an inflammatory hypertrophy(?) of the muscular wall.

A Lung-Stomach Fistula.—A cow suffered from chronic indigestion and intermittent tympanites. *Post mortem* showed a fistula between the first stomach, the diaphragm and the lung, produced by a rusty nail.

Hair-pin in the Soft-Palate.—A horse neither drank nor eat for six days. He was otherwise healthy. A hair-pin was at last found in his soft-palate. Upon removal, the animal took nourishment as usual.

A Fatty Liver.—In a fine old English stallion, which had only been fed on hay and oats, a very large and fatty liver was found, weighing over fifty pounds. There were hemorrhagic spots in it.

Intersusception in a Horse.—A horse had for several weeks suffered from constant indigestion and intermittent colic. *Post mortem* showed that the cœcum had been forced down into the colon.

Tetanus from Unskillful Castration was observed several times in young steers by Dr. Heizmann, of Messkirch.

The Result of Clipping.—A fine horse was clipped in the Fall of the year. Immediately after, a well-marked attack of pleuro-stholouos was observed, which lasted for four weeks.

A Fibro-sarcoma within the skull pressed upon the trigeminus, causing paralysis and complete atrophy of the muscles of mastication upon that side. The horse had to be killed.

Some Anomalies of the Circulatory Organs.—In a cow which died from an internal hæmorrhage it was found that a needle had passed from the second stomach into the arch of the aorta. An English stallion, eight years old, during life had been noticed to have a very slow pulse, and to be subject at times to convulsions (angina pectoris?). Post-mortem showed a marked eccentric hypertrophy of the right ventricle, and concentric hypertrophy of the left ventricle. A cow during life had a noticeable venous pulsation in the neck, and a large, firm, constant dilatation of the jugular vein. Post-mortem revealed a very great narrowing of the anterior vina cava, with thickening of the walls.

Hæmorrhoidal bleedings are occasionally observed in the cow and horse. In one case the bleeding veins were tied in a horse. Soon after, a bloody sweat exuded from the skin. The same bloody sweat has been observed in cows, without there being any apparent lesion of the skin.

Among the oxen used by the peasants of the Black Forest some curious cases of dyspnoea exist. The cause is the use of a very primitive form of yoke. This consists of a broad stick, which is tied across the breast of the ox. Thongs by which the plow is dragged are attached to either end. The stick presses on the trachea and causes a stenosis or narrowing of that tube.

Diseases of Elephants.—We desire to call the attention of our readers to the article written by Mr. Arstenstall, on the birth of an elephant, which took place at Bridgeport, in January, 1882. The writer is competent to speak on this matter, as he presided at the birth of the only two elephants born in America.

There are at present in this country eighty-eight elephants belonging to the different traveling menageries and zoological gardens, the value ef which ranges from $2,000 to $10,000 each, and where so much money is invested by a few persons in one species of animal, it seems important that the diseases incidental to the animal should be made a study of by our veterinarians, and not be left as they are at present, with one or two exceptions, to the treatment of men who act as keepers in the menageries. In the last number of the *Veterinary Journal* is found a list of the diseases to which the elephant is subject. The list comprises

Fever.
Inflammation of the brain and its membranes.
Inflammation of the lining membrane of facial sinuses.
Apoplexy.
Skin eruption from exposure to the sun.
Conjunctivitis.
Opacity of the cornea, due to indigestion.
Ulceration and sloughing of the external ear.
Progressive mortification of the tail.
Vomiting.
Spasmodic colic.
Flatulent colic.
Enteritis.
Purging, due to parasites.
Rot.
Bloody urine.
Asthemia.
Tetanus.
Rheumatism.
Boils.
Sprains.
Whitlow of the feet. Cracked sole. Bruised sole.
Inflammation of the lungs.
Serious effects of cold.
Foot and mouth disease, seen in Afghanistan campaign.
Galls on back.
Charbon.
Sunstroke.

The magnitude of this list is sufficient to show how important it is that veterinary surgeons should give the matter great attention. No book on the elephant has been written since Gilchrist's "Diseases of the Elephant," published in 1841, but we are promised shortly a work by Mr. H. H. Cross, who has spent thirteen years in India, with a view to study the habits and diseases of this animal.

THE TREATMENT OF SCRATCHES OR GREASE.—This disease consists of an inflammation of the heel of the horse, ending in fissures, ulcers, and fungous granulations. When very chronic a thick oily discharge is given off, from which the trouble has its name. It is not infrequent in this city, and coachmen impute it to the snow or snow and salt. It is not likely to occur, however, when the legs are kept properly cleaned.

The disease is not rare nor hard to diagnose. It is strange, therefore, that even among veterinarians the principles of treatment are yet but ill understood. Even in good text-books the old-fashioned treatment of wiping dry or washing and applying lard is still used.

In all except the early stages, the treatment should be to cleanse thoroughly and then apply astringents. One of the best is chloride of zinc in the proportion of gr. xxx to the pint of water. Glycerine may be added in order to make the astringent action more permanent.

NOTICES.—In answer to numerous inquiries, we wish to state distinctly that W. H. Clark, the author of "Horses' Teeth," a revised and illustrated edition of which is now being prepared, has no connection whatever with R. E. Clark, who has traveled about the country as an itinerant veterinary surgeon.

Dr. John N. Navin's article on "The Expansion and Contraction of the Horse's Foot" will be concluded in the next number of the JOURNAL.

We are indebted to Captain Peter F. Alba, of Mobile, who is a leading authority in everything relating to horses, for papers and documents.

We desire to call the attention of our subscribers to whom bills are sent with this number, requesting that they will forward the amount either by postal order, registered letter, or draft on New York or other cities.

Notice of Advertisements.—Especial attention is called to the Veterinary Surgeon's Visiting Chest, an advertisement of which appears in our present number. It is exceedingly convenient, cheap, and portable. With an extra dozen bottles it makes a very complete portable pharmacy. Those who have tested its merits practically consider it indispensable for all ordinary practice. The convenience of the small alcohol lamp which it contains is really worth the cost of the entire contents.

Acknowledgement.—Thanks are due Prof. Robert Jennings, of Detroit, Mich., for a donation of some exceedingly well prepared specimens of bovine tuberculosis, also for some rare illustrations of "aged wolf teeth."

Two very large specimens of intestinal calculi have been received for the College Museum, the gift of J. W. Hawk, D.V.S., of Newark, N. J. Also a six months' fœtus and placenta of a sea-lion.

E. S. Bates,
Dean Columbia Veterinary College.

CASE DEPARTMENT.

I.—EPITHELIAL CARCINOMA OF THE LEFT SUPERIOR MAXILLA, WITH SECONDARY DEPOSITS IN THE LUNGS.

REPORTED BY FRANK V. WALTON, D.V.S.

The horse from which this neoplasm was removed was a large gray gelding, aet 12.

He first came under personal observation suffering from very severe "quarter crack," which was then discharging pus quite freely. For this he was treated, and a reasonably speedy recovery followed.

From the time of recovery from above disease until the 1st of January, 1882, he remained apparently in the best of health. About this date, a slight enlargement was first noticed, situated at about the centre of the spine of the superior maxillary bone. There was also a slight, but quite offensive discharge from the mouth and left nostril. January 10th, the animal was first seen and examined. I found that there was quite a large tumor involving the left side of the superior jawbone. It was most prominent about midway between the orbit and the infra orbital.oramen. The base of the enlargement encroached upon and probably involved to a slight extent the molar and nasal bones of the same side. The principal bone implicated, however, was the maxillary. The center of the growth projected outward beyond the surface about five centimetres and was some nine centimetres in circumference at the base. The whole mass was of stony hardness, and appeared somewhat like an osteoma. Except for the discharge from the mouth and nostril, at this time, it was also observed that the third, fourth and fifth molar teeth of the same side were loose in their sockets. The posterior and middle third of the hard palate had a suspicious look, as if it was becoming invaded by a growth or bone disease, originating superior to it—possibly in the antrum, which might also be the cause of the external protrusion.

A few days later, another examination was made, and it was found that the tumor had gained rapidly in size, and that the condition of the palate was still more unfavorable. The horse had rapidly lost flesh and strength, was unable to eat any solid food, and with great difficulty even semi-solid. He also gave every evidence of suffering great pain.

The question of diagnosis and the advisability of an operation were carefully considered. The principal question of importance in relation to diagnosis was as to its being malignant in nature or not. There was a possibility of its being a simple osteoma, an abscess, a cystic tumor, or some one of the various forms of non-malignant disease of the antrum. If simple in nature, operative interference might be of great service in relieving the sufferings of the horse, and making him eventually useful for several years. From the general history, the rapidity of growth and the suspicious looking mouth, it appeared more like a sarcoma or a carcinoma, the former on account of the rapidity of the growth, and the latter from its extreme hardness.

With all these unfavorable possibilities clearly in view, it was considered advisable to operate, hoping that it might be non-malignant, and the final result good. If malignant, it was certain that the animal would be greatly relieved; and, possibly, by getting well behind the whole diseased mass, arrest its progress, thus temporarily curing the case and enabling him to work for several months or more before it would return.

The owners being informed of all the dangers attending the operation, accompanied with an unfavorable prognosis, gave their consent.

The animal was cast on January 17, 1882, and placed under the influence of chloroform and ether. A crucial incision was made directly over the most prominent part of the growth, and the four angles of integument dissected back. Just underneath and covering in the tumor, was a dense layer of fibrous tissue, giving the tumor the appearance of being encapsulated. An attempt was made to dissect around the capsule, but this brought the operators directly down upon the bone. Cutting through the capsule revealed the fact that the tumor sprang from within the antrum; that the bone forming the external wall of the superior maxillary sinus had become softened, and at points was entirely wanting. A large portion of the bone was very soft and easily cut with a bone chisel, under pressure of the hand. It now became evident that the greater portion of the superior maxillary bone was implicated, and an attempt was made to remove the whole of the diseased portion. On extending the crucial incisions, several enlarged facial branches of the inferior maxillary artery were divided, which gave rise to considerable hemorrhage, and took some time to secure.

The hard and fibrous capsules was cut through, when a softer form of tissue was met with, protruding from the cavity of the antrum. All of the growth protruding beyond the surface of the bone was removed, and then an attempt was made to remove the contents of the superior maxillary sinus and the diseased bone.

The growth being much greater in extent than was first supposed, it became apparent that nothing short of excision of one maxillary bone would carry us well back of the disease.

This being a very serious matter, the operation having already occupied one hour, it was thought best to remove one of the loosened teeth with the

alveolar wall, and in that way establish good drainage. The third moral was easily removed from the superior opening. The first and second were quite loose, and were left to be removed in a few days. About one hour after the operation the horse rose to his feet, but suffered quite severely from shock. The following day, however, he was feeling very much better, and was evidently suffering very much less than he had previously. The growth was examined at the Laboratory by Dr. Porter and Mr. Le Boutillier, who found that the neoplasm presented the characteristic features of an epithelial carcinoma, or epithelial masses, in the form of bird-nests or epithelial perles.

During the first week after the operation the horse seemed to improve, suffered less pain, and could eat fairly well. The discharge from the mouth, however, was quite bad, but that from the nostrils entirely ceased. From the open cavity of the antrum a fungus ulcer seemed to be developing, and the palatel processes became more and more implicated.

At the end of a week or ten days numerous enlargements were noticed over the surface of the body, which would easily lead one to suppose that they were farcy buds. These apparent farcy buds rapidly disappeared, and there was no positive evidence of glanders, and the fact of the original growth being carcinomatous in character would exclude the probability of glanders.

From this time until the day of death, although the horse was suffering comparatively little, he evidently was slowly and gradually failing, and a permanent recovery was utterly impossible, and on February 13th, it was decided that it was best to kill the animal.

The animal accordingly was killed, and a necropsy made by Dr. John Wallace. Most of the visceral organs presented the normal appearances, but the lungs were deeply congested and œdematous. They were also thickly studded with small nodules. These masses were carefully examined by Mr. Wm. G. Le Boutillier, who found that they also gave positive evidence of epithelial carcinoma in the shape of epithelial nests, the centre of which failed to take the staining fluid, and the corpuscular elements surrounding the same were arranged in concentric layers, that took the staining matter quite deeply.

The head of the horse was removed, and a careful examination showed that nearly the whole of the middle and posterior third of the palatel processes had been destroyed, and that the growth had also nearly occluded the left nasal cavity, and there was marked evidence of its passing through the septum. This condition would readily show that all operative interference was unable to completely relieve the animal from the cancerous growth.

New York City, March, 1882.

[To the veterinary surgeon this case presents many points worthy of careful consideration.

The result of this operation proves positively that the sufferings of the lower animals can be greatly relieved by scientific surgical interference. Were it possible to determine without doubt, before operating, that the disease was malignant and extensive, on human and other grounds, we would advise the killing of the animal. Had it been non-malignant, a good recovery would probably have been the result. Another fact to be observed is that the surgeon cannot always determine the extent to which the growth may have spread.

The special point of pathological interest is the marked epithelial type of the metastatic deposits in the lungs. In connection with a similar disease, located in the same region in the noted horse Prospero, there are leading points of difference.—ED.]

II.—RUMENOTOMY.

REPORTED BY J. LINDSAY, D.V.S.

On July 18th I was first called to attend a cow attacked with the following symptoms:

This unfortunate animal appeared to be suffering from impactione of th rumen.

Physical examination gave the following result: When the flank was pressed upon, over the region of the rumen, there was no perceptible indentation after the pressure was removed. Similar symptoms are met with in connection with a paralysis of the rumen, but in such cases a depression remains after removal of the pressure. From this I diagnosticated positively an over-distention of the rumen, and was led to believe the difficulty might be relieved by a brisk cathartic, and therefore ordered the following:

℞
Magnesia Sulphatis, et.
Sodii Chloridium, āā, ℥ viii.
Pulsis Zingeberis, ʒ ii.
Nuces Vomicæ, ʒ iii.
Aquæ, q. s. a. d., ℈ viij.

Mic. sig. at one drench.

This was to be followed by enemas of strong soap-suds, three times a day, and the animal to be allowed plenty of water to drink.

On the following day I found the cathartic had not acted, but the cow appeared brighter, and I concluded to wait another day before resorting to any operation. Ordered the enemas to be kept up, and as the animal was quite thirsty, took advantage of this fact to heip the cathartic by a greater bulk of fluid, thinking that, at the end of twenty-four hours more, the cathartic would act.

On the 20th the cathartic had not acted; the animal was dull, had lost her appetite, was no longer thirsty, had a staggering gait and was partially paralyzed in the posterior extremities.

Upon examination I decided that there was positive pittng of the rumen, and from this symptom felt fully convinced that I must operate immediately or the life of the animal would be lost.

Informing the owner of this fact and gaining his consent, I had the animal placed in a stanchion, with her right side against the wall, and strapped the posterior limbs firmly together.

I opened the abdominal cavity by an incision midway between the ilium and the last rib. The incision was commenced 7.5 centimetres external to the transverse process of the fourth lumbar vertebra, and extended outward and downward for 18 centimetres, cutting through the integument fascia and external and internal oblique muscles, the transversalis muscle and fascia, thus reaching the peritoneal coat, which was carefully cut through. In this way the centre of the rumen was exposed to view, and bulged out through the external wound. The rumen was carefully opened, and the edges carefully sewed to those of the external incision, to prevent any of the contents of the rumen falling into the peritoneal cavity.

This much having been successfully accomplished, I proceeded to remove the contents, which were very solid, and had to be broken down by the hand before any portion could be removed. I removed in all about two bushels of this impacted matter and carefully cleansed the parts with carbolized warm water (1 to 40).

The lips of the wound in the rumen were brought together in a way to secure perfect coaptation of the anatomical structures, especially the peritoneal coat, and temporarily held in this position by interrupted, carbolized cat-gut sutures.

The external incision was next brought together, and held in position by the same kind of sutures. The wound was then perfectly covered in by a large pitch plaster, thus excluding as much air as possible, and preventing the access of flies. Administered:

℞

Spiritus Etheris Nitrosi, ℥ vi.

Aquæ, q. s. ad., O i.

Mic. sig. pr. r. n.

I also had her covered with a fly blanket, and administered as a tonic:

℞

Aquæ Ammonia, et.

Tincture Zingeberis, et.

Tincture Gentian, āā, ℥ vi.

Mic. sig. ℥ iij. t. i. d. in a pint of gruel.

21st. The animal appeared somewhat brighter, had eaten some hay and drank a bucket of water. Diarrhœa set in, and the fæcal discharges were

very offensive. Cut off water supply and gave flour gruel, medicated with

℞

Tincture Opii, et.
Creta Preperata, aa, ℥ ii.
Sodæ Hyposulphatis, ʒ iv.

Mic. sig. in gruel.

22d. Animal much improved; diarrhœa checked; fæces nearly normal; appetite good; had laid down during the night. Stopped gruel and gave two quarts of steamed oats, with a little hay. Tonic still continued.

23d. Patient discharged, with orders to add small quantity of green food with the regular diet.

August 2d. Was again called in, and examined the wound, which was swelling very badly. The reason of this was that the plaster had slipped down, leaving a small hole at the top of the wound, into which flies had found their way, and it was alive with maggots. After removing the whole of the plaster, I found the stitches had all been torn out and the wound discharging very fœtid pus.

The wound in the rumen, however, had fully healed, and digestion was being performed perfectly. I mixed ℥ ii ot Calvert's carbolic acid No. 2 in one pint of water, and had the wound thoroughly syringed with the same every three hours. No attempt was made to bring this granulating wound together with sutures, but it was left to close by granulations from the bottom. Continued the use of the carbolic acid solution and kept it covered with a piece of muslin, saturated with the same solution, several layers of cloth, saturated with the carbolic acid solution, which was glued to the superior ridge of the back with pitch; in this way it was kept constantly covered. Over this dressing an abdominal bandage was applied and the cow covered with a fly blanket. In this way she was kept very nearly under a perfect antiseptic influence.

Sept. 5. The animal was perfectly cured.

I consider the results of this case as a fair test of the carbolic acid as an antiseptic dressing in veterinary surgery, and one which can be resorted to in an emergency.

This wound certainly had fallen into as bad a shape as we could expect to meet with, for it was filled with maggots and in a state of rapid decomposition.

The way in which the wound got into this very bad condition was by the neglect of the owner, who turned her out to pasture and failed to closely watch the progress of the wound. Several weeks after the wound had perfectly healed and there was no perceptible cicatrix visible.

HUNTINGTON, L.I., 1882.

[This case is certainly one of considerable interest, forcibly showing the value of antiseptic treatment of wounds in veterinary surgery when prac-

tically applied. The results were certainly all that any surgeon could desire. The way, also, in which the dressings were held in position is novel, and one that will probably prove of advantage and worthy the attention of veterinary surgeons.

The use of pitch, however, as a surgical dressing for animals is not new, but the manner in which it was applied in this case, I think, is entirely so. Antiseptic dressings have wrought wonderful changes in human surgery, and have been too long and too often neglected in comparative science. Here, however, we have a clear demonstration of its power, and a warning to all not to neglect its constant use in the future. If, then, the older methods of treatment allow the wounds of the unfortunate animal to become filled with maggots and decomposing matter, and modern treatment will effectually prevent such horrible conditions, it certainly is high time that the newer and more advanced ideas took the place of ancient customs. What condition of a wound could be more appalling to any sensitive or kind-hearted nature than that of one alive with maggots and one giving forth the most offensive odors from decomposition of the tissues. This case ought to be a warning to every veterinary surgeon, and always keep him on his guard against such conditions.—ED.]

III.—RETICULATED ROUND-CELL SARCOMA OF THE MEDIASTINUM, WITH SECONDARY DEPOSITS IN THE LIVER.

REPORTED BY FRANK V. WALTON, D.V.S.

The dog afflicted with this disease was a fine mastiff, between two and four years of age.

In March, 1881, he suffered from a large abscess located in the right cheek. An incision was made into the tumor, and the pus allowed to escape. The remaining cavity was injected occasionally with an aqueous solution of zinci-chloridum gr. x., to the ℥ i. Suppuration soon ceased, and the wound healed kindly. After this the animal gained in weight and flesh, and August. 1881, weighed about one hundred and seventy-five pounds.

In September, 1881, the animal was first noticed to be losing his appetite, and shortly was unable to swallow any large masses of solid food. He also gave evidence of having great difficulty with semi-solid food, and it appeared obstructed in its passage through the œsophagus and into the stomach. From this time on he rapidly emaciated, although all forms of tonics and stimulants were administered. As his trouble advanced he experienced considerable difficulty in breathing, and had a hacking, spasmodic cough.

In December, 1881, it was noticed that the quantity of urine passed was less than it had been before; micturation became more frequent, incomplete and painful. Toward the last the urine was very scanty, the attempts to

urinate very frequent and accompanied by great distress. The dog steadily sank, suffering pain, aside from the cystitis.

A necropsy was held the following day. The contents of the thorax were removed through the abdominal wall after the diaphragm was cut away. The object in operating in this way was to save the skeleton intact. The pericardial sac, both visceral and parietal, was invaded by a new growth, and it closely resembled the "hairy heart" of acute inflammation. There was no serous or purulent effusion into the pericardium.

The posterior medestinal space was completely filled with nodular masses, some of which were very soft and others moderately hard. The central point of origin of these new growths was apparently about the root of the lungs and origin of the great vessels. Large masses of the neoplasm had wedged in between the bifurcation of the trachea and the œsophagus, and in this way produced considerable pressure upon the œsophagus, which would readily explain the difficulty in swallowing during life.

The lungs were nearly normal and scarcely involved by the diseased process. There was, however, two or three very small growths in the anterior margin of the right lung. There was no striction either of the trachea or œsophagus further than that produced by the diseased masses. In the abdominal cavity the first thing noticed was an enormously distended bladder. When the bladder was cut open and the urine allowed to escape, there was a very large amount of sandy-looking sediment left upon the dependent portions of the mucous membrane. This inorganic deposit was examined microscopically at the laboratory and found to be composed chiefly of lime carbonate. The kidneys were the seat of numerous old infarctions, and had undergone a slight fatty degeneration. The liver was thickly studded with small white nodules which closely resembled, in their microscopic appearance, the tumors of the medestinal span.

Microscopic examinations of the new growths, both of the chest and liver, were made. Both presented nearly the same appearance, being composed of large round connective tissue corpuscles, which were arranged in delicate walled alveolar spaces. In both situations the tumors were very vascular, and contained many extravasations. This growth may, therefore, be regarded as sarcomatous in nature, and of the reticulated round cell variety.

New York City, 1882.

IV.—STRONGYLUS, SEU EUSTRONGYLUS GIGAS, ASCARIS RENALIS.

REPORTED BY EDWARD S. BREEDER, D.V.S.

The horse afflicted was a bay gelding, æt. 6. He suddenly became lame about one week before he died, while being driven to a single truck.

When first examined he was found to have a centre crack on the right posterior foot.

For three days he was treated by a surgeon, who then gave the animal up, as he was too sensitive to allow any local treatment unless placed under anæsthetics.

He was then sent to the Columbia Veterinary College Hospital in an ambulance.

Within a few days before he became lame he had rapidly emaciated, but prior to that had always been quite well and very serviceable.

The day following his admission to the hospital the house surgeon noticed that the urine passed by the animal was thick, slimy, and of a deep yellow color. It was then evident that the centre crack was not the only trouble, and it was certain he was also suffering great bodily pain. He rapidly became prostrated. Opiates were freely administered, but with no apparent relief, and he died that evening.

A *necropsy* was made the following day.

Thoracic Cavity.—The pericardial sac was congested, but the amount of fluid was about normal. The heart cavities contained large post-mortem clots, but firmer than those commonly met with. They were of a dirty yellow color and resembled an ante-mortem clot. These clots extended from the cavities of the heart well into the pulmonary artery and its branches, and also into the aorta. The one removed from the pulmonary artery was about two feet long and was composed of many shreds.

The heart was soft, pale and fatty. The walls of both ventricles were not more than half the normal thickness; of a pale, yellow color, as compared with the normal, and both were very fatty.

At one point of the endocardium there was positive evidence of endocarditis in the shape of an endocardial ulcer.

The lungs were quite free in their pleural sacs. Each sac contained some serous fluid, and the right a little clotted blood. Both lungs were œdematous and deeply congested. The base of the right lung presented a peculiar appearance, the substance being partly destroyed and resembling an open network of fibres, with a sponge-like appearance—resembling the angiomatous developments sometimes met with.

The lungs were also studded with numerous dentate calcareous masses, the centres of which contained a fluid substance.

Abdominal Cavity.—The peritoneal sac contained a large amount of blood and coagulum, also twenty-one round worms, varying in length from nine to twelve centimetres. They were of the lumbricord variety.

The alimentary tract was normal, with the exception of the stomach, which was a little softened.

The genito-urinary tract, up to the kidneys, appeared normal. Both glands were the seat of very interesting changes, presenting a very peculiar appearance. They were full of small round holes about one centimeter in

diameter. These holes were very numerous, giving the kidneys a worm-eaten appearance. This change was supposed to be due to the passage of the round worms through the gland tissue for two reasons. First, the holes passed through the capsule, as well as the kidney tissue, and a second worm was found in one of the kidneys. Microscopic examination of the organs showed that the renal cells were slightly granular, but otherwise quite normal in appearance. Transverse sections of the openings gave them the appearance of pretty clean-cut holes at the expense of the kidney structure. Each canal was surrounded by a thin layer of inflammatory exudation; but the inflammatory action was limited to a very thin area, and evidently had not irritated the gland tissue to any marked degree.

The *liver* was nearly destroyed, little else remaining than a mass of cavernous tissue which was rapidly passing into a gangrenous condition. In its removal it was torn in various directions, and it was quite apparent that it had given way before or just after death, and it was probably from the liver that the peritoneal hæmorrhage came.

NEW YORK CITY, March, 1882.

[This case is one of the exceptional cases met with in medicine. The strongylus gigas is said to be common to man, horses, oxen and dogs. There is another form of parasite which is said to occur in the human kidney, which is not mentioned in Prof. Law's table of parasites common to various animals. Possibly the Tetrastoma renalis is the more common form when it occurs in the human kidney. This parasite, however, is not generally believed to inhabit the intestines, and undoubtedly this case is that properly entitled Strongylus gigas.—ED.]

V.—ULCER OF THE ŒSOPHAGUS, POSSIBLY CANCEROUS IN NATURE.

REPORTED BY A. D. STURGIS,
Student in Veterinary Medicine.

Previous History.—The cow was somewhat advanced in years, and had suffered from a cough for the past ten years or more. For the last two months she had given every evidence of being a very sick animal. At first it was noticed that whenever she attempted to eat grass or anything solid, it caused nausea, and the major part of what was swallowed was vomited. Later on water produced the same effect as the solid foods. Some of the solids and fluids, however, must have passed into the stomach and been digested.

When I first saw the animal she was very weak and emaciated, lying on the ground, where she had lain for the past forty-eight hours, unable to rise. Respirations, eight per minute; pulse imperceptible.

Owing to the extreme prostration of the patient, treatment was not considered, and it was concluded to destroy the animal.

When the throat was cut not more than two quarts of blood escaped, and that was very pale compared with that ordinarily met with.

Necropsy Immediately after Death—When cut open all evidence of adipose tissue had disappeared, little remaining save the skeleton.

The mouth, tongue, fauces and pharynx were carefully examined, and nothing abnormal found.

The superior portion of the œsophagus also appeared normal, but when near its junction with the stomach, a very large eroded and ulcerated spot was met with.

The ulcer in the œsophagus was fifteen centimetres in diameter. At this point the wall of the gullet was thickened, but there was no evidence whatever of a stricture. The ulcerated portion was examined microscopically at the School of Histology and Pathology, in connection with the Columbia Veterinary College and School of Comparative Medicine, by Professor Porter and William G. Le Boutillier, who rendered the following report: "Sections were made which included the apparently healthy portion of the œsophagus and the ulcerated portion. At the junction of the two the pavement epithelium of the normal mucous membrane was unusually well marked and somewhat enlarged. The ulcerated portion upon the free surface was similar to ordinary granulating tissue; its base, however, was of a dense fibrillated connective tissue substance. The muscular coat was somewhat hypertrophied, and each muscular bundle and often each muscular cell was surrounded by this dense tissue. At many points the muscle elements had dropped out and left a series of fibrous rings.

"No positive evidence of a carcinomatous structure could be detected, but some suspicious points were met with."

WILTON, CONN., March, 1882.

[The inability to swallow in this case could hardly be accredited to an organic stricture, but the irritation of food passing the eroded spot may have caused a spasmodic stricture above the ulcerated portion, and thus prevented the passage of any solid food and even fluids into the stomach. —ED.]

VI.—METROTOMY.

REPORTED BY J. V. NEWTON, V.S.

I was called, some weeks ago, to see a cow near this city who, the night before I arrived, had been, to all appearance, perfect health. The morning prior to my visit she had given birth to a calf, and the uterus had become inverted. When I arrived at the farm and made an examination, I found the lower portion of the uterus badly lacerated, and that it was rapidly falling into a gangrenous condition. Under such circumstances the only thing to be done was amputation of the same.

I placed a strong ligature well above the diseased portion, drawing it very tight to prevent, if possible, all hemorrhage. I then severed the organ one inch posterior to the ligature. Practically there was no hemorrhage attending the operation. For a few days I had the cow fed on a spare and laxative diet. The recovery was perfect, and in two weeks she was feeding two calves.

TOLEDO, OHIO, February, 1882

VII.—TENATOMY.

REPORTED BY J. V. NEWTON, V.S.

Some time ago I had occasion to see a horse suffering from a disease of the hock joint, which had lasted for more than a year. The hock had been fired and blistered repeatedly, until the final result of the original disease and treatment was in a contraction of the tendons to such a degree that the toe could not reach the ground. At this time he was walking on the fetlock joint.

I gave an unfavorable prognosis. The horse was then cast and both tendons divided, and shod with a long toe shoe, and at the end of three months was able to do his share of farm work. A few months later could be driven on the road, and showed but very little lameness.

TOLEDO, OHIO, Feb. 2, 1882.

CORRESPONDENCE.

EDITOR JOURNAL OF COMPARATIVE MEDICINE AND SURGERY:—

A few years ago I turned a fat cow into a small yard in which had been a bed of onions, in the harvesting of which many imperfect ones had been left. After remaining in the yard about seven hours she was killed. The muscle was found untainted by the onions she had eaten; the fat emitted a very appreciable odor when cooked; the marrow when cooked emitted so strong and offensive an odor as to make it very unpleasant to remain in the kitchen. The three experiments were tried the same day the cow was killed. May not the comparative physiologist learn something from this as to the assimilation of food and the rapidity of the deposits from the blood in the various parts of the system? May not this suggest further experiments in the same direction by more competent observers?

J. D. CATON.

OTTAWA, ILL.

REPORTS OF COMMENCEMENTS, SOCIETIES, ETC

COLUMBIA VETERINARY COLLEGE.

The annual commencement-exercises of the Columbia Veterinary College and School of Comparative Medicine were held in Chickering Hall, Thursday evening, March 30th. The relatives and acquaintances of the students and the many friends of the College crowded the hall—even standing-room commanding a premium. The stage was beautifully decorated with rare exotics and living plants, and, in many instances, the graduates were overloaded with the many floral offerings of their friends. Soltair's orchestra discoursed most excellent music, and everything betokened healthful prosperity and hearty good-will.

The Rev. Dr. Duffy opened the exercises with an appropriate prayer, after which Alex. Hadden, M.D., President of the Board of Trustees, conferred on the graduates the degree of Doctor of Veterinary Science.

The following is the list of graduates:

Edward S. Breeder, New York City; Edward A McLellan, Bridgeport, Conn.; Edward F. Dowd, New York City; Edward W. Douglass, Brooklyn, N. Y.; George F. Bowers, Brooklyn, N. Y.; Edwin M. Fitzgerald, New York City; Wm. A. Soula, Providence, R. I.; Philip Newman, Brooklyn, N. Y.; James W. Hawk, Newark, N. J.; Flavius Josephus Smith, Austin, Texas; David L. Johnston, Scarsdale, N. Y.; Richard A. Finlay, D.V.S., New York City.

Professor E. S. Bates, Dean of the College, awarded the Junior Certifitificate of Honor to the members of the Junior Class, who, on final examination in the studies of the Junior year, had scored an average rank of 70 per cent. He congratulated the class on the very satisfactory exhibit which they had made during the first six months of veterinary instruction, and urged the making of greater effort as they advanced in a more intimate knowledge of comparative medical science.

The Junior Certificate was then awarded to he following:

W. E. A. Cuff, New York; W. H. Jackson, Poughkeepsie; H. C. Slee, New York; H. L. Ramacciotti, Australia; Theo. De Clyne, New Durham, N. J.; H. W. Rowland, Metuchten, N. J.; A. D. Sturges, Wilton, Conn.; W. H. Lowe, Little Falls, N. J.; T. E. Shultze, Brooklyn, N. Y.; Geo. H. Browne, New York City; F. A. K. O'Shea, New York City; R. L. Parkin, Brooklyn, N. Y.

Professor J. H. Gunning, awarded the prizes as follows:

Faculty prize, gold medal, valued at $50—best general examination—to E. A. McLellan.

Honorable mention in connection with this prize was made of George H. Bowers, E. M. Fitzgerald, E F. Dowd, E. S. Breeder and E. W. Douglass. The contest for this prize was very close, all the contestants taking exceptionally high rank.

The silver medal awarded to the Junior student passing best final examination was awarded to Henry C. Slee, of New York, honorable mention being made of A. D. Sturges, of Connecticut.

The Shoeing prize, a silver medal, was awarded to D. L. Johnston, Scarsdale, N. Y.

The Jurisprudence prize, a case of valuable foot instruments, was awarded to E. S. Breder, of New York.

The Pathological prize to Wm. Soula, Rhode Island, consisting of a veterinary surgeon's visiting chest. An Anatomical prize, consisting of a valuable mouth speculum, was awarded E. A. McLellan.

The Coates prize was awarded to H. C. Slee for the best essay on "Knuckling Over."

A students' quintette club furnished some very excellent vocal music, and the exercises closed with a very able and instructive address by E. M. Hunt, M.D., Secretary New Jersey State Board of Health.

The term which has just closed has been the most satisfactory since the organization of the college. Forty-three new students have matriculated during the term. Over one-half of the graduating class were honor men, or took a rank on final examination of 90 per cent. and upward. The classes are now so large that the accommodations of the lecture room are inadequate to provide for the numbers present, and efforts are being made to erect new and more commodious buildings. We chronicle these facts, as they indicate a growing interest in the subject of comparative medicine, which argues well for its future.

AMERICAN VETERINARY COLLEGE.

The annual exercises of the American Veterinary College were held on the evening of March 6. The following is a list of graduates: Gabriel Smith Agesborg, Vermilion, Dakota; Joseph Ferdinand Autenreith, Jersey City; William Stoughton Devoe, New York City; George Sherbrooke Houghton, New York City; Lester Heard Howard, Clinton, Mass.; James Samuel Kemp, Jr., Holbrook, L. I.; William Manz, New York City; William Howard Martenet, Baltimore, Md.; Charles Leroy Moulton, Manchester, N. H.; Frank Eugene Risley, Waterville, N. Y.; Horace Ward Atwood, B.S., North Orange, Mass.; August Joseph Jeannin, Navarre, Ohio; George Henry Keefer, M.D., Hillsdale, Mich.; John Albert Leighton, New York

City; Everett Woodhull Rowland, Miller's Place, N. Y.; Ward Beecher Rowland, Media, Pa.; Fred. Saunders, Salem, Mass.; Frank Traver, Rhinebeck, N. Y. The medals awarded are as follows: Best general examination, Board of Trustees prize, gold medal, Joseph S. Kemp, Jr.; second best; examination, Alumni prize, standard veterinary works, Lester H. Howard; best practical examination, New York State Veterinary Society prize, gold medal, Joseph S. Kemp, Jr.; silver medal, given by Dr. Liautard, for best general examination in junior class on Anatomy, given to W. B. C. Noyes.

MONTREAL VETERINARY COLLEGE.

The annual commencement of the Montreal Veterinary College took place on March 30. Prof. Osler addressed the graduates, giving them some excellent advice as to their future, urging them to continue their studies and to take notes of everything as they went through life, that being the only way great discoveries in science were made. The following gentlemen having fulfilled the requirements of the curriculum and passed the successful examinations, written and oral, in botany, chemistry, physiology, cattle pathology, and practice of veterinary medicine and surgery, received the diploma of the eollege:

A. J. Chandler, Coaticook, Que.; Walter Wardle, Montreal; Alexander Glass, Philadelphia; Fred Torrence, Montreal; C. B. Robinson, Middlemarch, Ont.; Joseph M. Skally, Boston; D. E. P. Campbell, St. Hilaire, Que.; Paul Paquin, St. Andrews, Que.; Olivier de Maisonneuve, Terrebonne, Que.; Philias F. Labelle, St. Doro.hee, Que.; Pierre Gadbois, Terrebonne, Que.

The following prizes were distributed: Silver medal for best general examination, A. J. Chandler; special prize for general proficiency, Alexander Glass; microscope for practice of veterinary medicine and surgery, A. J. Chandler. Second prize, Fred Torrence, B.A. Obstetrics and Cattle Pathology—First prize, A. J. Chandler; second, Walter Wardle. Anatomy—First prize, Walter Wardle; second, A. J. Chandler. Entozoa prize, won by Fred Torrence; Dentistry prize won by C. B. Robinson.

ONTARIO VETERINARY COLLEGE.

The annual examination of the students in attendance at the Ontario Veterinary College were brought to a close last Friday forenoon, and about one o'clock the presentation took place in the large lecture-room of the college. Dr. Smith, the principal, occupied the chair, and Mr. Duncan discharged the duties of secretary. Over one hundred students and graduates were present to take part in the proceedings, which were of the most enjoyable and enthusiastic character.

PRIZEMEN.

The following is a list of the successful students to whom prizes were presented:

Pathology.—Silver medal, T. B. Cotton; 2d prize, W. A. Dryden; 3d, J. T. Claris.

Anatomy.—Silver medal, W. A. Dryden; 2d, J. Hugo Reed; 3d, Lyman Vandervoort.

Entoza.—Prize, D. P. Yonkerman.

Microscopy.—Prize, C. W. Stowe.

Physiology.—1st prize, J. Hugo Reed; 2d, D. P. Yonkerman.

Chemistry.—1st prize, J. Hugo Reed; 2d, D. P. Yonkerman.

For Anatomical Preparation.—Prize, W. Parkins.

Materia Medica.—J. Hugo Reed (senior), 1st prize.

Breeding and Management of Live Stock.—1st prize, $20, given by the Commissioner of Agriculture, J. Hugo Reed; 2d, $15, given by the Agricultural and Arts Association, T. B. Cotton, and $10 to J. N. Cook.

The gold medal, for the best general examination, was presented to Mr. J. Hugo Reed, of Georgetown, Ont.

GRADUATES.

The following is a list of the students who graduated this year:

W. S. Bell, Kars, Ont.; L. D. Blanchard, Mount Eaton, Ohio; H. G. Borneman, Clayton, Pa.; J. L. Brodie, New London, Iowa; G. W. Burt, Lynnvalley, Ont.; J. T. Claris, Buffalo, N. Y.; R. C. Clark, Wellesley Village, Ont.; J. N. Cook, Glanford, Ont.; S. J. Cottam, Edinburgh, Scotland; T. Bent Cotton, Mount Vernon, Ohio; W. A. Dryden, Tavistock, Ont.; F. Goulding, Richmond, Mich.; G. H. Hall, Chatham; J. Hodgins, London, Ont.; J. D. Johnston, Wahoo, Nebraska; J. Lawson, Acton, Ont.; W. G. Lyons, Cheltenham, Ont.; Alex. McDonald, Cobourg, Ont.; J. G. McInally, Lynnvalley; W. McLain, Nanticoke, Ont.; W. Parkins, Beeton; C. A. Pierce, Creston, Illinois; A. Porteous, Simcoe, Ont.; J. Price, Pine Lexington, Penn.; J. H. Reed, Georgetown, Ont.; W. T. C. Scanlon, London; C. L. Smith, Silver Cliff, Colorado; H. H. Sutherland, St. Francisville, Ill.; B. F. Swingly, Oregon, Ill.; A. Tanner, Drayton, Ont.; W. Tanner, Mount Forest, Ont.; F. A. Thomas, Paisley, Ont.; L. Vandervoort, Trenton, Ont.; A. A. Walker, Wingham, Ont.; J. A. Waugh, Pittsburg, Pa.; W. J. Waugh, Pittsburg, Pa.; A. E. Wessel, Wooler; J. Whytock, Teeswater; T. Wrigglesworth, Georgetown; D. P. Yonkerman, Cleveland, Ohio.

An address of a highly complimentary character was delivered by the Hon. Adam Crooks, who spoke of the excellent work which was being done by the college, in the success of which his colleagues of the Ontario Government took a deep interest. It afforded him the greatest pleasure to be called upon to take part in the presentation of prizes to the students. He resumed his seat amidst applause.

Addresses of a similar character were delivered by Prof. Buckland, Prof. Barratt, Prof. Thorburn, Mr. Wade, and other gentlemen, each of whom bore testimony to the good work which was being done by the college.

A life-size portrait was then presented to Dr. Smith by former graduates

of the college, as a mark of esteem for him as Principal. It was accompanied by a complimentary address.

Principal Smith acknowledged the kindness of his friends in suitable terms, after which the proceedings were brought to a close.

COUNTY VETERINARY MEDICAL SOCIETY OF THE STATE OF NEW YORK.

The County Veterinary Medical Society was incorporated in January, 1879, under the General Laws of this State governing such institutions. The promoters of this Society contended that there were no opportunities given to practical veterinary surgeons to prove their capabilities; and after organizing, they appointed a Board of Censors to examine any person who has been in actual veterinary practice for five years, and, if found competent, a certificate of qualification was granted.

The first year, twenty-seven applicants appeared for examination, and only four were given certificates; in the second year, twenty-three, and only five were given.

The Society has since increased in membership to fifty-six; includes veterinary surgeons from all over the State, constituting it the largest veterinary organization in the United States. They hold their meetings on the first Saturday in each month, in Room 24, Cooper Institute, at eight o'clock in the evening. The Society, at its meetings, debate over the diseases at the time prevalent, and obtain the various opinions and line of treatment adopted by each, with the result. Papers are read on various scientific topics appertaining to dumb animals, communications are received from the rural districts, giving the opinion of the country veterinary surgeons on the prevailing diseases in their localities. Their meetings are very interesting, and the Society promises to be a large and flourishing veterinary organization. They had an annual meeting in March, and elected as president, Dr. W. T. Carmody, M.R.C.V.S.; vice-president, Prof. J. A. Going, M.R.C.V.S.; secretary, G. P. Delisser, V.S.; assistant secretary, E. L. Tavanes, V.S.; treasurer, W. C. Bretherton, V.S. The Board of Censors for the ensuing year are: Professor C. I. Smith, M.D.; Prof. R. W. Finlay, D.V.S.; Prof. J. A. Going, M.R.C.V.S.; R. A. Finlay, D.V.S.; Ralph Ogle, V.S.

FARMERS' AND DAIRYMEN'S ASSOCIATION.

A meeting of the Farmers' and Dairymen's Association of Queens County was held in the hall of the Educational Association, in Westbury, Long Island, March 1st. The chief purpose of the meeting was to consider the subject of pleuro-pneumonia among cattle—a subject that has awakened a

deep interest among the farmers of Long Island. A report was presented by a committee appointed at a previous meeting to investigate the measures that had been taken to prevent the spread of pleuro-pneumonia among cattle. The committee said that they had thoroughly examined into the subject of the inoculation of neat cattle, and were of the opinion that inoculation was the only prevention against the spread of contagious pleuro-pneumonia. A sub-committee of three had an interview with Governor Cornell, in which they urged the Governor to legalize inoculation. In relation to this, Governor Cornell said he was not thoroughly familiar with the subject, and, therefore, would have to take sufficient time to post himself before authorizing any action in the matter.

Mention was made by the chairman of the charges that diseased cattle had been sold to butchers.

A member of the association asked whether there was any penalty, under the State laws, where individual farmers inoculated their own cattle.

Mr. Williams answered that there was a law against the inoculation of cattle in this State, and if any farmer inoculated his cattle, the State Inspector was authorized to kill the animals.

President Cocks favored the drafting of a bill legalizing inoculation, which should be introduced in the Legislature at once. A resolution was adopted requesting the Queens County Agricultural Society to appoint a committee to unite with the legislative committee of the State Agricultural Association in securing legislation on the subject of inoculation for cattle. John D. Wing, Isaac H. Cocks, and General N. M. Curtis comprise a special committee, appointed by the State Agricultural Society, to attend to all legislation relating to the prevention of contagious diseases among cattle.

NEW SOCIETY.

A number of veterinarians met in Dublin, and formed a new society, to be called the Irish Central Veterinary Medical Society, electing T. D., Lambert, F.R.C.V.S., President; A. E. Ross, M.R.C.V.S., T. H. Suncocks, M.R.C.V.S., John Malcolm, M.R.C.V.S., Vice-Presidents; J. J. Sperring M.R.C.V.S., Secretary and Treasurer.

REVIEWS.

THE HORSE IN MOTION, AS SHOWN BY INSTANTANEOUS PHOTOGRAPHY, with a Study on Animal Mechanics, Founded on Anatomy and the Revelations of the Camera, in which is Demonstrated the Theory of Quadrupedal Locomotion. By J. D. B. Stillman. Executed and published under the auspices of Leland Stanford. Boston: James R. Osgood & Co.

Messrs. Osgood & Co., of Boston, have just published a handsome and interesting quarto volume, entitled "The Horse in Motion," prepared at an outlay of over $50,000 by Governor Stanford, and years of scientific experiments and investigation by Mr. Muybridge at the Palo Alto stud farm of the Governor. It contains a series of photographs of the horse while in motion, taken by means of twenty-four cameras, placed in line one foot apart, capable of producing an impression by the exposure of one five thousandth part of a second, so great was the sensitiveness of each camera. By means of these the position of each part of the horse's stride while running was obtained with scientific exactness, and the results of these experiments prove that the hitherto prevailing notions regarding the modes of motion of the horse were all wrong. The theory generally accepted was that the horse when running lifted his fore feet, and with an impulse from his haunches plunged into the air, alighting on his fore legs. The photographs show that this is entirely different, the hind feet, which are the chief instruments of propulsion, being the first to leave the ground, one fore foot being used as a sort of lever to lift the whole body, and then employed as a leaping pole to propel the body forward. We give sketches of the cuts that show the movement of a running horse:

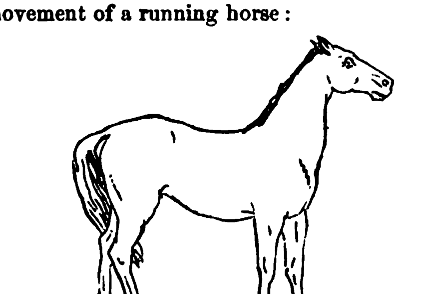


Fig. 1.

Fig. 1 gives the position of the animal in readiness to start.

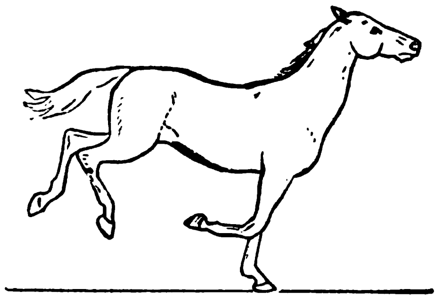


Fig. 2.

Fig. 2 represents the beginning of movement, with the hind legs up in the air, the left fore foot upon the ground, nearly under the cent e of gravity, while the right fore foot is bent upward.

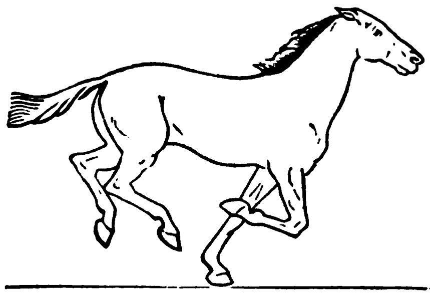


Fig. 3.

Fig 3 shows the body carried forward, so that it can no longer be supported by the forelegs.

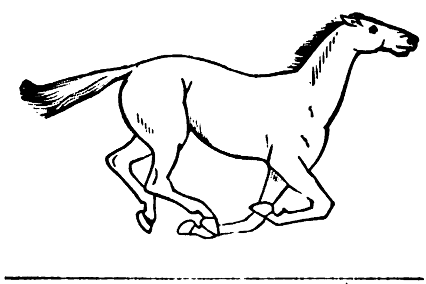


Fig. 4.

Fig. 4 shows all the feet off the ground, and the horse completely in the air. There is now an opportunity, if the horse wishes, to change his feet in the gallop.

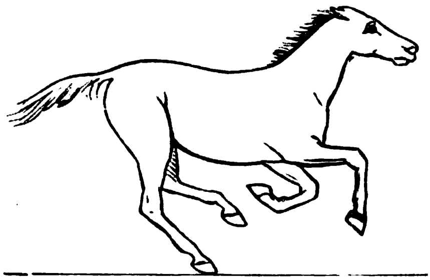


Fig. 5.

The first check to the descent of the centre of gravity is given by one of the hind legs, as shown in Fig. 5.

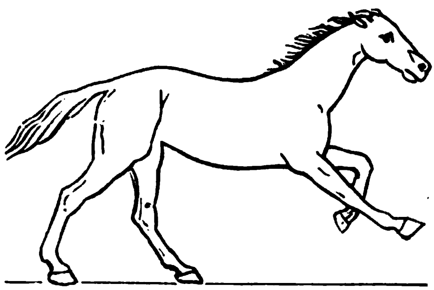


Fig. 6.

Fig. 6 represents both hind legs upon the ground, the body moving forward and requiring more advanced support.

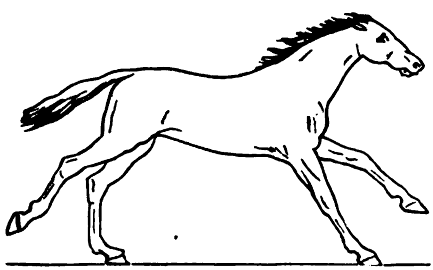


Fig. 7.

Fig. 7. The right hind leg has given its final propulsive impulse, the left hind leg has passed the perpendicular, and is no longer in a position to give much aid as a supporter to the centre of gravity; but the right forefoot has reached the ground and takes its position as a supporter of the weight of

the body, dividing the burden with the left hind leg still upon the ground.

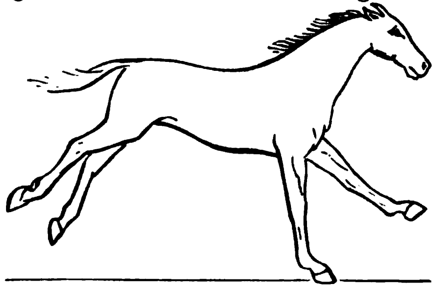


Fig. 8.

Fig. 8. The right fore leg is now taking the entire weight of the body; the left hind foot is clear of the ground, the muscles of the near hind leg are exerted, and from them the body receives a new impetus, and is carried forward, upheld by the off fore leg.

The scientific world is deeply indebted to Governor Stanford for this useful work, in the preparation of which no expense has been spared, and veterinarians especially will read with interest and profit Dr. Stillman's clear and succinct explanation of the muscles of the horse.

MITTHEILUNGEN UBER DAS BADISCHE VETERINARWESEN, in der Jahren 1874 bis 1880 bearbeitel von MEDIZINALRATH A. LYDTIN, mit 12 lithographirten Tafeln. Karlsruhe: 1882.

Report upon the veterinary police regulations for the years 1874 to 1880, by the medical superintendent, A. Lydtin. With twelve lithographic plates.

The veterinarian of this country may well view with envy the advanced condition of his art in Germany, where such a report as the one before us is published by the government.

We learn from it how carefully regulated is the practice of veterinary medicine, and how perfect are the sanitary provisions for the care of the lower animals.

The book is a large one. It contains chapters describing the organization of the veterinary police, the condition and work of the veterinarians, with statistics, tables and charts showing the prevalent diseases.

It furnishes the model which we hope our States will eventually imitate.

JOURNAL OF THE BRITISH DAIRY FARMERS' ASSOCIATION FOR THE IMPROVEMENT OF THE DAIRY HUSBANDRY OF GREAT BRITAIN. Vol. I. Nos. 3 and 4. London. 8vo. pp. 142.

This journal is published by the Association for the Improvement of the

Dairy Stock and Dairy Produce of the United Kingdom. It contains several papers read at the meetings of the Association. Among the principal ones are: Shorthorns as Dairy Stock, by Finlay Dun; Abortion in Cows—an exhaustive paper on the subject, by Prof. J. Wortley Axe. In support of the theory that abortion is not contagious, he cites the following: "One of twelve cows slipped her calf about the middle of May, without any assignable cause. The fœtus and its membranes were unavoidably allowed to remain in the pasture for several hours. Three days after the event a second cow aborted; and three others followed suit, at intervals of from four days to three weeks, notwithstanding that every precaution was taken to isolate the cows as they fell, as well as in the exercise of a strict sanitary regime. From the vagina of the third case about a dram of thick, glairy discharge was taken and carefully introduced into the vagina of a cow from another stock, six months advanced in pregnancy. At the same time another portion of the same matter was inoculated into the skin of the vagina by superficial scratches. A negative result followed the experiment, and the cow completed the period of gestation, and produced a fine healthy bull calf." "From what has already been said, it will appear that the extension of abortion from one animal to another may and undoubtedly does take place, as the result of the action of the effluvium emitted from the ejected contents of the uterus on the sensorial centres; and that the prevalence of a malady in a herd may be explained entirely apart from the contagious influences.' Goat's Milk as Food for Infants and Invalids, by Dr. R. J. Lee, M.R.C.P.; and the Composition of Goat's Milk, by Dr. Aug. Voelcker, F.R.S. Dr. Voelcker considers goat's milk equally as nutritious as cow's milk, and givesthe following analysis of it:

CONSTITUENTS.	PER CENT.
Water	82.02
Fat	7.02
Casein	4.67
Milk Sugar	5.28
Mineral Matter (ash)	1.01
	100.00

NINETEENTH ANNUAL REPORT OF THE STATE BOARD OF AGRICULTURE OF THE STATE OF MICHIGAN, for the year ending August 31st, 1880. ROBERT G. BAIRD, Secretary. Lansing: 1880. 8vo, pp. 496. Cuts.

This interesting report contains much valuable matter not only to farmers, but to breeders of stock. The report of the cattle commission gives a full and detailed account of the Texas cattle-disease, pleuro-pneumonia and glanders. It also recommends certain rules to prevent the spread of the last-mentioned disease. A large portion of the volume is devoted to the proceedings of the farmers' institutes, containing discussions on Jersey cattle, short-horns, management of sheep, insect pests and many other things important to farmers.

TRANSACTIONS OF THE WISCONSIN STATE AGRICULTURAL SOCIETY. Vol. XIX. Prepared by GEO. E. BRYANT, Secretary. Madison: 1881. 8vo. pp. 500.

This volume contains a number of papers and addresses on various subjects of interest to the farmer, among which may be mentioned the Diseases of Plants and Animals, as Connected with Bacteria, by Prof. J. C. Arthur; Ensilage, by I. C. Sloane; and numerous interesting and instructive articles.

THE BREEDER'S GAZETTE. A weekly journal published at Chicago, devoted to the stock-breeder, turfman, and dairyman. Edited by Mr. J. H. Sanders, who ranks as one of the most eminent writers of the present day on live stock. The various departments are handled with force and vigor. It is published at $3 per annum.

BOOKS AND PAMPHLETS RECEIVED.

ELEMENTS DE THERAPEUTIQUE DOSIMETRIQUE ou restauration de la medecine Hippocratique avec les agents Therapeutiques de la science contemporaine. Par le Docteur FELIX PAQUET. Paris.

TRAITEMENT DOSIMETRIQUE DE LA DIPHTHERIE par le sulfure de calcium. Memoire communique par le Docteur P. A. FONTAINE au Congres International de Medecine Dosimetnque de Madrid.

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CURRENT FALLACIES ABOUT VACCINATION. A letter to Dr. W. B. Carpenter, C.B. By P. A. TAYLOR. M.P. Second edition. London: 1881. 8vo. pp. 37.

BY-LAWS OF THE NEW YORK COUNTY VETERINARY MEDICAL SOCIETY. Incorporated 1879. 8vo. pp. 11.

REPORT OF THE COMMISSION ON DOMESTIC ANIMALS. Made to the Connecticut Board of Agriculture. Hartford: 1882. 8vo. pp. 24.

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THE ROCKY MOUNTAIN MEDICAL TIMES: A monthly journal of medical, surgical and obstetrical science. Denver.
JOHNS HOPKINS UNIVERSITY CIRCULARS. Baltimore.
WALSH'S RETROSPECT. Washington.
VIRGINIA MEDICAL MONTHLY. Richmond.
THE WESTERN MEDICAL REPORTER. Chicago.
THE MEDICAL SUMMARY: A monthly journal devoted to practical medicine and new preparations. Lonsdale, Pa.

PROGRESS OF VETERINARY SCIENCE.

THE BEST DISINFECTING AGENTS, according to Mr. W. M. Hamlet, are in general those capable of exerting an immediate and powerful oxidizing action, and that it is active oxygen, whether from the action of chlorine, nitric oxide, or hydrogen peroxide, which must be regarded as the greatest known enemy to bacterial life.

RESUSCITATION OF FROZEN ANIMALS.—Out of twenty animals treated by Prof. Manassen, by the method of gradual resuscitation in a cold room, fourteen died; of twenty introduced at once into a warm apartment, eight perished; while of twenty placed immediately in a hop bath all recovered. —*International Surg. Record.*

MILK VEIN.—What is usually called the milk vein of a cow is the vein which conveys the blood passing through the udder along the belly to the heart. Its size should always be noted, as it indicates the amount of blood passing through the udder which, in a great measure, governs the amount of milk.

OIL MEALS.—According to Prof. Armsby, of the Conneticut Experiment Station, cottonseed meal is the more valuable for fattening animals and for cows in milk, while linseed meal is better for growing stock, having less "fat" and more "nitrogen free extract." The exact proportionate value has not been ascertained, as no long-continued experiments in actual feeding have been made. Cottonseed meal contains 42.9 per cent. of "protein" compounds, 17.3 per cent. of fat, 18.6 per cent of nitrogen free extract, and 7.4 per cent. of crude fibre; dry matter, 93 per cent. Linseed meal has 29.4 per cent. of protein compounds, 11.8 of fat, 34.1 of nitrogen free extract, and 8.8 of crude fibre; dry matter, 90.6 per cent. These are the averages of the analyses in Prof. Armsby's tables.—*Country Gentleman.*

PLEURO-PNEUMONIA IN CATTLE.—The Queens County (N. Y.) Farmers' and Dairymen's Association held a special meeting for the purpose of hearing the report of the committee appointed by the association to examine into the question of inoculation to prevent the spread of pleuro-pneumonia, and also to investigate the manner in which one of the State veterinary surgeons had or had not complied with the laws on the subject, passed in 1878 and 1879. The committee reported that inoculation of neat cattle is the only preventive against the spread of pleuro-pneumonia. The committee also reported that Alexander O. Hopkins, State Veterinary Surgeon, had violated the laws of 1878 and 1879, and instructions under the same, in that he had permitted infected cattle, killed to prevent the spread of the disease, to be dressed by butchers and shipped to the New York market. The committee reported that they had waited upon Governor Cornell, and informed him of these facts.

The Effects of Cod-Liver Oil on Monkeys.—In August, 1880, a large ourang-outang was placed in the Westminster Aquarium. He suffered from a very severe bronchitis, contracted during the intense cold of the winter. Treatment consisted in keeping the air moist by means of steam and by giving internally cod-liver oil, milk, and a small quantity of carbonate of ammonia. He recovered completely under the treatment and is now in perfect health, but nevertheless the cod-liver oil is continued, the animal using a wine-bottle full a week.

The reporter of the observation observes that we must attribute the return to health to the cod-liver oil. In the zoölogical gardens of Frankfort, where the climate is not favorable to the monkey tribe, they have examples of great longevity in these animals. Mandrils, chacmas, and other animals of this class, live in this establishment fifteen to eighteen years, whereas the average duration of life in other institutions of the kind is about two years. The remarkably good health and long life of the quadrumina in these gardens is attributed to the fact that the director, Dr. Schmitt, gives them all cod-liver oil during the winter season. These observations seem to show that the effect of cod-liver oil is essentially the same on the monkeys and apes as on human beings.—*L'Acclamation.*

The Vivisection Question in the German Parliament.—A petition was presented to the German Parliament some time ago, asking for the restriction or abolition of vivisection. The matter was referred to a committee, which, through its chairman, Prof. Hüter, of Griefswald, has recently reported against the petition. The report was accompanied with a motion that, considering (1) that, in the interest of science, vivisection appears to be indispensable in teaching institutions; (2) that changes in the penal statutes, in the direction desired by the petitioners, have not been shown to be necessary; (3) that the petitioners have the opportunity of laying their complaints of any abuses in regard to vivisection before the local authorities who have the regulation of the teaching institutions. Prof. Virchow denied the correctness of the statement made by the petitioners, that experiments were performed in the universities to a great extent by students. He proceeded to show that vivisection was indispensable to the progress of medical science.—*Medical Record.*

A Simple Means of Detecting Trichinæ.—According to John Phin the parts of an animal that should first be examined are the diaphragm, tenderloin, and muscles about the head and throat. In a ham the most likely place is that part at which the muscle ends in a tendon. Cut off a thin slice with a very sharp knife, or with a pair of scissors curved on the flat. This thin section should then be soaked for some minutes in acetic acid, spread out on a thin piece of glass, and covered with another similar piece. These two slips are then pressed together. A compressorium, by means of which the plates of glass are forced together by a lever and screw, answers admirably. But better still he finds the trichinoscope, which is a compressorium holding the two glass strips, but fitted with a simple microscope on a sliding frame, which permits the examination of a specimen in each part. His plan is as follows: A thin piece of flesh, moistened with a mixture of equal parts of acetic acid and glycerine, is placed on the lower plate and spread by means of needles fixed in wooden handles. The upper plate is then brought down on the lower one, and the screw is turned into the slot in which it fits. By turning the nut, any degree of pressure may be brought to bear on the flesh, which is thus rendered so thin and transparent that any trichinæ present will be readily brought into view.—*Medical Record.*

Notes on Seven Fatal Cases of Hydrophobia.—Mr. Southam has tabulated his notes of all the cases of hydrophobia seen during two years' term of office in the Manchester Royal Infirmary, and furnishes some items of interest from a clinical point of view. As the treatment cannot be based upon any definite pathological condition which is to be met, it became purely symptomatic, and resolved itself into four principal methods: 1st, by chloral and opium; 2d, by chloroform and curara; 3d, by tracheotomy; 4th, by the hot air bath. Of the four drugs mentioned, chloral appeared to secure the most beneficial results, prolonging life, and temporarily arresting the spasms. Its administration was readily effected hypodermically, the introduction of the needle causing no spasm. With regard to curara, the author found in two instances that there were alarming symptoms of respiratory weakness, once after one-sixth grain had been administered, and yet the spasms were not relieved. Tracheotomy, which was performed to obviate death from spasms of the glottis, was of little use. In six of the cases death was due to gradual heart-failure, and in only one to spasm of the glottis. In respect to the temperature, it was found in three cases to have risen above 103° F., and in one to above 105° F. The urine of all the cases contained albumen. In three instances there was sugar in the urine, indicating, probably, that some abnormal condition of the medulla oblongata was present.—*Medical Record.*

Hydrophobia: Its Successful Treatment.—Mr. Ruxton, a surgeon in the East Indies, reports a very remarkable case, which seems worthy of being classed with the small number of cures that are now on record. A boy, between five and six years of age, was bitten in 1874 by a bull-bitch, that was subsequently killed. The bites were deep and severe, but were freely cauterized with fuming nitric acid, causing considerable loss of tissue. Carbolized oil was subsequently employed as a dressing. A month later he became unconscious, refused to drink, and was exceedingly nervous. Mr. R. finding him with saliva issuing from the mouth, suspected the worst, but ordered, as a temporary measure, the tepid sheet and a diaphoretic mixture. Tranquil sleep and diaphoresis followed, but about one in the morning the patient awoke screaming, had frequent convulsions, refused liquids, and foamed at the mouth. Thinking that, as a palliative, cannabis indica might be usefully employed, five minims of the tincture were given, and a short sleep followed. This dose was repeated after an interval marked by screaming fits and saliva-spit between the teeth. Deep sleep, lasting ten hours, now ensued. On awaking he recognized his mother—the first time for twenty-seven hours. His pupils were now intensely contracted. A third dose of five minims was given on the evening of the second day of medical attendance, and sleep ensued for eighteen hours. Pulse and respiration remained good all the time. From this point the progress toward recovery was steady and continuous.

Vaccine Applied to Sheep.—At a farm near Melum experiments were made yesterday by M. Pasteur in the presence of a host of specialists, on the duration of the action of anthraic vaccine as applied to sheep. It will be remembered that six months ago M. Pasteur vaccinated a number of sheep with anthratic vaccine, the immediate result being to preserve all these sheep from anthratic virus; whereas, sheep not so vaccinated succumbed within twenty-four hours to the latter. The question was how long the influence of such vaccine would last. Yesterday's experiments proved that it lasts six months, and they will be continued from month to month to ascertain the exact duration of the preservative. On Thursday, four unvaccinated

sheep were inoculated with anthratic virus, as also four of the sheep vaccinated six months ago. Two of the unvaccinated sheep expired within twenty-four hours, and the other two subsequently; whereas, the sheep vaccinated six months ago admirably resisted the action of the virus. Another curious fact was ascertained. A lamb, the offspring of a vaccinated sheep, was inoculated with the virus. It expired within twenty-four hours, thus proving that the vaccine virtue is not transmitted hereditarily. The Seine-et-Marne Agricultural Society presented M. Pasteur on Thursdry with a gold medal, and a banquet was held, at which the great service rendered to agriculture by his discovery was warmly testified to.

Pleuro-pneumonia in Cattle.—The President transmitted to the Senate the report of a commission appointed by the Secretary of the Treasury to report on the lung plague of cattle, or pleuro-pneumonia. The commission, composed of Messrs. James Law, E. F. Thayer, and J. H. Sanders, have prepared an exhaustive history of the disease and the causes which led to its introduction and spread in this country. The ultimate source of lung plagues, the commission say, is not known. Up to the present time it has successfully eluded all investigations. Like small-pox, measles, the plagu e, etc., cattle lung plague is only known as it is transmitted by its own contagious products. All historic records of lung plague betray its continuous existence in different parts of Europe, where it has prevailed from time immemorial, and show further that the invasion of a new country by the pestilence has ever been the sequel of the transit of cattle from an infected region, either in the commissariat parks of a belligerent army or in the channels of an opening commerce. The report says that the pestilence began in this country in 1848, when an infected English cow was landed in Brooklyn, and has since extended about 300 miles south. The commission reach the conclusion that the unvarying absence of lung plague apart from contagion is a perfect guarantee that it can be permanently eradicated, and maintain that in every instance where a nation has stamped out the infection no new cases have appeared until there has been another importation of infected stock. Long delay in stamping out the disease in the United States means its extension to the open cattle ranges and the impossibility of stamping it out. With the near prospect of a general extension of the plague and the yearly sacrifice of tens and scores of millions of dollars to its insatiable craving, to say nothing of the continued incubus on our foreign market, to delay the work of extinction which is now in our power savors of criminality.

The Horse's Frog.—If we were to go to many a blacksmith and ask him if he did not think nature had made a mistake in putting the clumsy frog into the horse's foot, he would hardly be ready to say yes, and very likely would put on a surprised look, and perhaps explain that in some countries horses did very well without shoes, and so the frog was left to care for itself. But while not ready to take ground with you in any criticism of the plan upon which the foot is constructed, you have but to look in the corner of the shop where two horses stand newly shod; lift up their feet and observe for yourself, that if the blacksmith has not said it, the knife has said the frog is a bad thing, and must be cut away. The horses do not stand on the ground, but nearly half an inch higher, on the iron of their shoes, which takes the weight of the horse on the outer shell of the hoof. The practice is as sensible as it would be for a man who had to travel on all fours taking the weight on the nails of his fingers and toes rather than on the cushion which lies behind them. It is always the soft part—the India rubber part of the feet of animals that have such—which receives the weight, and not

the shelly, hard part. We know what an elephant's foot is; it is all rubber-like. The horse has the same encased in a shell, which gives him accuracy and steadiness of movement. Now, this casing protects the frog. It grows slowly, the frog grows rapidly. The healthy foot of the colt shows a centre, if not protecting, at least level with the line of the hoof. He does not take his weight wholly on the rim of his feet. Old horses would have feet more like them if blacksmiths would allow they knew a little less than nature, and really knew enough to read her intentions.

The object in shoeing the animal, aside from the occasional one of changing its gait, is simply to prevent the wear and shattering of the outer shell, and to enable it to take a firmer hold of the ground, escaping the slipping of the unshod horn. It is an unfortunate incident of our system of shoeing that the horse is raised from the ground as a boy is when he mounts stilts. —*The Blacksmith and Wheelright.*

A Remedy for the Cattle Plague.—Mr. H. Cloete, a prominent colonist of the Cape of Good Hope, informs the Speaker of the House, through the Hon. Levi P. Morton, our Minister to France, that he and his friends are the proprietors of an effective and inexpensive remedy for pleuro-pneumonia, or lung disease, in cattle. He speaks of his method as follows:

"When one or more animals show symptoms of the disease the entire herd is put under treatment. Within ten days all those infected, however slightly, are dead. Those not infected, after being slightly indisposed for a few days, afterward become quite well, and are proof against the disease for at least seven years, and in all probability for their natural lifetime. By this mode of treatment any country can not only stamp out the disease, but insure itself against future loss. I am prepared, if the United States Government desires, to come to the States and give proof of the efficacy of this mode of treatment, and feel certain that a similar mode could be made applicable to prevent foreign cattle going into Texas from catching the Texan fever."

Mr. Cloete, who was recommended by Viscount Lyons and Lord Granville to Minister Morton, says that he is urging upon all foreign governments the consideration of his discovery.

Texas Fever, or Splenic Fever. (Also called Spanish Fever.)—Generally, after four to six weeks of co-habitation of native or Northern cattle with Texan or Southern cattle, or after exposure to the contaminating principle of this disease, an elevation of the bodily temperature of from 103° F. to 107° F., may be observed, and which is immediately followed by a general dullness and sluggishness, drooping head with hanging ears, a more or less arched back, hollow flanks, more or less stiffness of the hind quarters, and knuckling over of the hinder fetlocks. Gradually the breathing becomes quickened, and there is more or less quivering of the muscles of various parts of the body and neck. While the animals may continue to eat and ruminate to the very last, they soon lose strength, often lie down, preferably in damp or wet places, when such are readily accessible. Dropsical swellings may appear between the branches of the lower jaw, or under the chest. The muzzle is dry, and the eyes gradually become staring and glassy. The breathing becomes quicker as the disease progresses; the bowels become costive; the dung is more or less blood-stained, and towards the last the urine becomes of a deep red or nearly black color. After gradually increasing prostration and listlessness, the animal lies down motionless, outstretched in a profound stupor, in which conditions it dies slowly, and generally without a struggle. Normal condition of oxen and cows—The pulse per minute varies from 40 to 50; respiration varies from 15 to 20 per minute; average

range of temperature during confinement, from 100 2-5° F. to 101 3-5° F.; when at liberty, it averages from 101° F. to 102° F.

Diarrhœa amongst Calves.—A German agricultural journal gives publicity to the experiences on the above subject of an agricultural proprietor in the Posen District, from which it would appear that, during one month, he lost from this cause fifteen calves within a few days of their birth. The symptoms were as follows: Sudden and violent diarrhœa, bad purging, general debility, followed by death on the second or third day. Those animals which survived were in a heavy, drowsy state for some time.

The examination made of the carcases of the calves which had yielded to the disease showed analogous symptoms in each case, the stomach and intestines being empty, the membrane covering the intestines partially reddened, and the lungs in several cases in a diseased condition.

The owner's suspicions lay in the direction of the feeding of the cows whose progeny was thus affected. For some months each cow had been given two pounds of rapeseed cakes, two pounds of wheat-husks, five pecks of turnips, seventeen and a half pounds of clover, nine quarts of distiller's wash —with salt as required. The rapeseed cakes he suspected were not free from admixture of mustard, and in view of the comparatively small quantity of the wash, he could only attribute the blame to these cakes. As a change of diet, he reduced the quantity of cakes to half a pound (obtained from a different source of supply), and increased the weight of wheat husks to two and a half pounds, thus effecting a reduction in the total quantity of food, as the animals were getting too fat. During the first few days after the change of diet (which took place February 23d) several calves were attacked, to which a small dose was administered three times a day, consisting of bicarbonate of soda and carbonate of magnesia. This was successful in some cases, while in others the animals had to be slaughtered. In the latter instance, however, the lungs were found not to be affected. To the calves which fell ill after March 14th, the following mixture was given: One part of carbonate of soda, one part of bicarbonate of magnesia, two parts two per cent. solution of carbolic acid, five parts water. The calves which were given thie mixture (the dose being a tablespoonful three times a day) all recovered, and afterwards remained in good health.

From the salutary action of the carbolic acid the owner of the animals concluded that parasites were the cause of the inflammation of the bowels, manifested by the redness previously alluded to as having been noticed in the coating of the intestines.

Acting upon this supposition, he caused all the walls, as well as the coverings, etc., of the cowhouse to be whitewashed, and laid down every evening plenty of disinfecting lime, so that the animals, both old aud young, would be subjected, while the doors were closed for the night, to the full influence of the carbolic acid. The result of these measures was satisfactory.

After twenty-five years' experience in weaning calves, it has been found that neither astringents, aperients, nor anti-acids have much to do in saving a calf when scouring badly. The best thing to do is never to let a healthy calf lie in the same pen as a diseased one—it is most contagious. Instant removal, warm spice gruel and cleanliness is the best cure.

A leading continental journal, in commenting upon these statements, remarks that, where cows are heavily fed, the calves are seldom in better condition than when the cows have only been kept up to an average standard of weight, experience proving that the fatter cows are, a proportionate increase of mortality and a greater liability to infection is manifested in their calves.

LUNG SICKNESS OF CATTLE.—We are indebted to Mr. A. Wilkinson, of the Ottawa Estate, Natal, for the following particulars of his carbolic acid remedy, which is the only thing he has found of any use. It is well worth a trial. He writes:

"On the first appearance of the disease showing itself in a herd of cattle, give them all round a dose of carbolic acid once a day for two or three days, as a preventive to the spread of the disorder.

"The dose is thirty drops of crystalized carbolic acid in half a soda bottle of raw linseed oil (mind it is not boiled oil), twenty drops for a two-year-old, and ten drops for a yearling. When a beast has got the complaint, give the dose three times a day: when getting better, twice; and continue it some time once a day, or until all symptoms have disappeared.

"The carbolic acid must be the crystalized kind (Calvert's No. 2 acid was used), which is dissolved by placing the bottle in hot water or in the sun. It is convenient for measuring the acid to get a small phial, put the number of drops in with a minim glass, then scratch a notch on the bottle with a file.

"If the cattle could be kept in a warm shed, they would have a better chance; and if tied up, cloths dipped in common carbolic acid and water (Calvert's No. 5 quality, in 50 parts of water) hung up before their noses might be beneficial to stop the spread of the infection.

"Any cattle attacked by the disease shourd be separated from the herd at once. As soon as it can be done, a beast, when attacked, should have a blister, made of half euphorbia juice and spirits of turpentine, applied behind the shoulder-blade, low down over the lungs.

"It would be advisable at the same time, when the sickness makes its appearance in a herd, to inoculate all the cattle not attacked, by putting a seton dipped in the virus or water taken from a fresh lung, not too far gone in the disease; the seton should be inserted in the brush of the tail, and taken out the next day, and care must be taken when inoculating not to let the needle touch the bone of the tail. Should the tail swell after, lance it freely, and foment with hot water; also give a dose or two of Glauber's salts. On no account should the virus be taken from the lung of a beast which has died from lung sickness. In that case the blood would be poisoned, and probably few survive.

"This remedy, if taken in time, will, I believe, cure two out of three. Four years ago I had the lung sickness in my herd, and for the first week tried the homœopathic treatment—all died; then I tried paraffin for a week, with the same result. On commencing the carbolic acid there was very soon a change for the better, and cattle which had been standing about and not eating commenced to eat again. Half of these latter got over it, and in a fortnight were sleek and fat, the linseed oil having that effect. Should the cattle be purged lessen the quantity of oil. If this remedy had been known earlier, I believe thousands of cattle might have been saved in Natal. After the first two or three times four Kaffirs were enough to give the medicine—two to hold the horns, one to hold the head up and the tongue on one side, another to pour the dose down. Take care to hold the head up some little time until the animal has swallowed the oil."—*Land and Water.*

WYOMING CATTLE LAW.—A bill has recently become a law in Wyoming Territory, which undertakes to deal very strictly with cattle afflicted with contagious diseases. A Territorial Veterinarian is appointed to inspect all cattle which he may have reason to believe are affected with any contagious disease, and if found so affected, to order them killed and the carcases

burned, the territory paying the owners the value of the animals destroyed. Owners of diseased cattle are forbidden to sell or give away or butcher diseased cattle. The importation and exportation of diseased cattle is forbidded, and when the cattle of any locality are found to be afflicted, none can be sent away without the order of the veterinarian. When the Governor believes that the disease is epidemic in other places outside of the territory, he may forbid the importation of cattle from such places. No person is allowed to conceal the existence of infectious diseases or obstruct the veterinarian in the performance of his duties. Heavy penalties are attached to the violation of the law. The provisions are the most thorough and rigid of any law of the kind that we have knowledge of, and evinces a determination on the part of the territorial authorities to summarily stamp out any contagious disease that may originate among or be brought to the cattle of Wyoming.

GLANDERS.—Glanders, as every one knows, is a highly contagious disorder of solipeds, and is now very prevalent in the United Kingdom. In London it is especially so, and causes great losses to owners of horses. It is readily communicable between the horse and ass species, less so between these and other species, but man is frequently infected. It is a most repulsive malady, and is incurable. Very much of our knowledge respecting it is entirely due to experiments on living animals. Not unfrequently it manifests itself in a chronic form, and with such vague symptoms (though it is, nevertheless, as contagious as if these were well marked) that the most skillful veterinary surgeon cannot tell for certain whether it is the disease or only an ordinary catarrh. If it be glanders, then to allow the animal to live is to endanger the life of every horse and man who come in contact with it; while to destroy it, if the malady is not contagious, would be cruel and unnecessary. When time is an object, or facilities for isolation are not present, then test inoculation must be resorted to. For this purpose a worthless horse, or, better still, an ass, is inoculated, and a few days suffice to decide whether glanders is present. If the result of the inoculation is affirmative, the experimental animal manifests symptoms generally at the seat of inoculation, which causes it little if any discomfort, and it is at once destroyed, as is also the suspected horse. By this precautionary procedure many horses, possibly those of an entire regiment or army corps, may be saved from peril, and human lives preserved from a loathsome and fatal disease. In elucidating the processes of disease, in framing preventive measures, in investigating the spread of contagious disorders, as well as in perfecting modes of cure, and the most humane methods of surgical operation, experiments on living creatures are absolutely necessary, for their own interests no less than for those of mankind. Veterinary medicine and surgery are based on humanity no less than on utility, and their aim is to remove or alleviate pain among the animals placed under the domini n of man. By experiments in pathology disease and mortality have been vastly diminished, and continued experiments in the same direction will cause further diminution. If mankind benefits, so do animals. A discovery which will avert disease in one will probably do so in the others; every advance of knowledge is a boon to all. To prohibit resort to experimental pathology would be at once to doom creatures which we are bound to protect to the endurance through all time of terrible suffering from diseases that might otherwise be vanquished. Abhorring cruelty in every shape, and desirous of abolishing it by every possible means, I must nevertheless deprecate the attempt to place a barrier across the path pursued in pathological investigation on animals.—*George Fleming, in Nineteenth Century.*

NEWS AND MISCELLANY.

HONORS TO A VETERINARY SURGEON.—Mr. H. Bouley, member of the Institute, Paris, Inspector General of the Veterinary Schools, France, has been raised to the rank of Commander of the Legion of Honor.—*American Veterinary Review.*

NEW VETERINARY SCHOOL—Was opened at Lemberg, Poland, under the direction of Dr. Seifmann, of the Kazan Veterinary School, with Drs. Baranski and Kaydi as professors.

WEIGHT OF A COW'S BRAIN.—The weight of the brain of the cow at the third year of life is inferior to that of man. The average weight of the adult human brain is 48 oz. and that of the cow about 16 oz. The weight of the brain of a child three years old greatly exceeds that of a cow of the same age.

THE CELEBRATED HUNTING DOG, LINCOLN, owned by Harry Bishop, of Tennessee, which has been at New Albany for treatment on account of a railroad accident, died last week. The dog cost $2,950 in England.

GREENWOOD CEMETERY REPORT.—The successful introduction of the grey squirrel is referred to as having added a new and attractive feature to the rural character of the cemetery. "Forty of these graceful creatures," says the report, "were there set free early in the Spring, and at once made their homes in the boxes provided for them in the trees. Such is their rapid increase that, before the close of the year, they numbered in all about 150." The destruction of objectionable animals and vermin in the cemetery has been "continued with diligence." The result of this warfare was the extinction of a fox, the second one ever killed in the cemetery, 11 moles, 25 rats, 70 dogs, 199 cats, 75 snakes, 586 ground mice, and 3,051 chipmunks. The trustees point out the fact that not a skunk or muskrat was found during the year.

UNDER PERFECT CONTROL.—To show how completely Captain P. F. Alba has subdued and mastered, by the law of intelligent kindness, that horse once known as the man-eater, we will state that on last Monday afternoon, while the Alabama State Artillery were firing a salute on the wharf in honor of the arrival of the Emperor Felix, Captain Alba rode this horse down between the two guns and sat him there while the firing was going on. Sometimes both horse and rider were invisible from the smoke of the rapid discharges. The horse seemed to have no fear, but rather to enjoy the excitement.

SPANISH CATTLE.—In consequence of the recent arrival of a cargo of Spanish cattle at Jersey, many of which were suffering from disease, the Veterinary Department of the Board of Trade has informed the States Assembly of that Island that, unless stringent measures be adopted in respect of such cattle, it may be found necessary to order the slaughtering of Jersey cattle landed in England for exhibition or otherwise.—*English Live Stock Journal.*

Vivisection Again.—Two prizes, one of 2,000f. and another of 1,000f., have been offered by the Danish Society for the Protection of Animals for the best and second best essays showing how far recently killed animals may be substituted for living ones in pursuing physiological experiments. The essays, which may be written in Danish, Swedish, English, French, or German, must be forwarded to Mr. A. de Haxthausen, the President of the Society, at Copenhagen, before September 1st of the present year. The object is to abate those investigations in which "animals are subjected to great and lingering agony."

Bears of Berne.—Berne, the venerable capital of the Helvetic Confederation, has recently been stricken by a grievous bereavement. On Christmas eve, Mani, the elder of the two tutelary bears, dear to every Bernese heart, which have for so many years past enjoyed honorable publicity in the Fosse aux Ours of the Ursine City, took his departure for that bourne from which no bear, however estimable and popular, has ever yet been known to return. But for the fact that Mani, some twenty-one years ago, did to death an Englishman who imprudently tumbled into the pit inhabited by the Bernese Bruin—at that time in the heyday of impetuous and inconsiderate youth—we should share the regrets of his mourning fellow-citizens to a greater extent than the remembrance of that ill-judged act will at present permit us to do. As it is, we can but offer them the expression of a mitigated condolence, and of the hope that Mani's successor, should a stray Briton fall into his clutches, will prove the quality of mercy not to be quite so lightly strained in his case as it was in that of the too-choleric departed.

New Horse Disease in Philadelphia.—Within the last few days stablemen throughout the city have been surprised at the appearance of a peculiar disease among many of the horses under their charge, affecting the feet and ankles of the animals in a most unusual way. The first symptoms are fever and inflammation upon the parts around the pasterns and below the fetlock. The following morning there are running discharges of thick yellowish matter, and afterward pus begins to flow freely. The horse becomes lame and dispirited and is totally unfit for work. Experienced horsemen appear to be at a loss to comprehend fully the nature of the disease, but all are united in the opinion that it has been caused by the salted railroad tracks. The treatment to be followed, according to veterinary surgeons, is to poultice the ankle with bran or flaxseed to remove the fever, and then to use astringents. The horses must have perfect rest until all evidence of the disease is gone, for exercise will only tend to reopen the sores. A few of the street railway horses are afflicted, but the drivers are reticent in speaking of the matter.

Clydesdale Horses.—Over eighty head of Clydesdale horses were shipped last week by the Glasgow Clydesdale Horse Breeding and Exporting Company to Colonel Robert Holloway, of Alexis, Ill. Says the London *Chambers of Agriculture Journal*, of Feb. 20: "When it was intimated last July that a company had been formed for the purpose of exporting Clydesdale stock to America, a number of persons thought the scheme impracticable. Two large shipments left Scotland last Autumn, and the movement thus organized promises before long to become an established trade. The vast prairies of the West offer magnificent opportunities for breeding horses, and the rapid growth of the cities in the States has created a demand for heavy draught animals hitherto unprecedented."

Scarlet Fever among Horses.—The so-called "pink-eye" of horses is attended with soreness of the throat, difficulty of swallowing, swelling of

the glands of the neck, dropsy of the legs and disorder of the kidneys; the affection of the eye is the least part of the trouble. This disorder the best French veterinary surgeons have pronounced to be scarlet fever, with or without the addition of diphtheria. There are 10,000 horse stables in the city, housing 85,000 horses, of which about 6,000 die each year, some of them of pink-eye. Many of these stables are in the best parts of the city; the majority of them are dirty and unsavory, and in few or none are disinfectants used. Gypsum is perhaps the best absorbent and deodorizer, although pine-wood shavings and saw-dust are very good. Cerebro-spinal meningitis is also common among horses. It seems to be an acute typhoid, or septic rheumatic inflammation of the membranes of the brain and spinal cord, produced by exposure to cold and wet and impure air. It is not directly contagious, but is conveyed in the same way, perhaps, that typhoid fever is.—*Times.*

How Street-Car Horses are Fed.—The ration for street-car horses in this country is now pretty definitely fixed in all our cities. For summer this ration is half oats and h lf corn, ground together, sixteen pounds to each horse, with twelve pounds of cut hay. In winter, sixteen pounds of corn meal, with the same amount of hay, forms the ration. Corn meal alone in summer is too heating, but in winter the corn meal seems well adapted to keep up animal heat and condition, and, being cheaper than oats, is generally adopted in New York city; but in many other cities half oats is used the year round. If these companies would substitute clover hay for timothy, corn meal would make a well-balanced ration. The clover would make up for the deficiency of the corn meal in muscle-sustaining food. Clover is rejected because it is liable to contain dust, which may develop heaves; but this fear is groundless under the plan now adopted of moistening the cut hay and mixing the meal with it. It is fed in a damp condition, and, therefore, no dust can be present to affect the lungs. Clover hay is not properly appreciated as a food for horses. It has a higher value than timothy, and is usually sold at $2 to $3 per ton lower in market. Corn is too much used by some car c mpanies. It is a fattening and "heating" food *par excellence*, and not a muscle builder.—*National Live Stock Journal.*

Cattle Troughs and Infectious Diseases.—The cattle troughs that have been placed in so many parts of London have not been an unmixed blessing to the animals for whose benefit they were instituted, and there is too much reason to fear that infectious diseases have been largely circulated among the stables of the metropolitan district by means of these troughs. The subject was referred to at the last meeting of the St. George's, Hanover Square, Committee of Works, when a letter was read from the Metropolitan Drinking Fountain and Cattle Trough Association, Westminster, requesting permission to place a cattle trough in the King's Road, Euston Square. This proposal met with opposition, one of the members of the committee moving that the permission requested be not given, on the ground that these troughs were a cause of disease being spread among horses. In the end, the committee decided to state, in reply to the application, that in their opinion the troughs, as at present constructed, are sometimes the means of spreading disease, owing to the circumstance that there is no stream of water through them. The improvement suggested might be made, we imagine, without much difficulty, and would remove the principal objection to the troughs.—*St. James' Gazette.*

Birth of an Elephant in London.—If the prognostications of the

naturalists be correct, there will shortly be born a real English elephant in the Zoological Gardens. The first of its race who has entered Europe, other than an alien, since prehistoric times, it will form a notable addition to Western curiosities. Time was when the mammoth and the elephant no doubt looked upon England and the rest of Europe as their happy hunting-ground, and roamed at their own sweet will where they listed. But London in those primitive days was not yet dreamed of, and the Zoological Gardens extended all over the land. Since then elephants have not bred in Europe, and have shown signs of disappearing even from Asia; while the constant demand for ivory in Africa must seriously have diminished the number of tusks in the "dark continent." For an elephant, then, to be born in England is an event of no small interest, and a direct proof of the strides which the scientific knowledge and treatment of animals have attained. As a British elephant, the newcomer will be absolutely the only one that existed, for when the foot of the tropical fauna trod this part of the globe before, there was no Great Britain existing, and what are now islands were joined hard and fast to the main land. It is certainly against the probabilities that, after the lapse of so many ages as have passed since then, the elephant should once more appear as a native of the North.

HINTS FOR CURING BALKY AND UNRULY
against his near shoulder, and with your right hand seize the foreleg just above the pastern joint, raise the foot as high as you can, and force it forward. This will in most instances prove effectual.

2. Stand in front of the horse and draw his ears through your hands for two or three minutes, stroke his nose, and lastly take him by the head, and in an encouraging voice urge him to go forward.

3. If in single harness, and with a two-wheeled vehicle, take your animal's head and turn him round four or five times, keeping the inside wheel as near as possible in the same place.

4. Tire your steed out by remaining perfectly quiet until he starts of himself. I once sat in my cart nearly two and a half hours in this way.

Now and then a horse is met with that refuses to draw at all. Put him in a cart in a shed, and keep him there till he walks out. In one instance that came to my knowledge, the obstinate one was thirty-six hours in the shafts before he gave in.

If it is intended to cure a restive horse, he must be used solely by one and the same person, and caught young; and let his rider or driver bear in mind that with both restive and nervous horses the voice will prove more effectual than the whip. Stick to your nag if possible, under all circumstances; for, rely upon it, if he can get away from you, he will redouble his efforts to do so again. Unfortunately, there is always a risk in buying a once willful steed, for in fresh hands he may revert to his old tricks.—*London Live Stock Journal.*

THE GOAT SOCIETY.—The Duke of Wellington, K.G., President of the British Goat Society, occupied the chair at the annual meeting of members, held on Monday last. There was a good attendance. The Hon. Sec., Mr. H. S. Holmes Pegler, read the report. The number of members now is 242. A stud-goat register has been established. The system of supplying goats to cottagers works well. The large demand for goats and the increasing use of goat's milk as a food for infants have led the committee to consider the desirability of starting a limited company for the importation, breeding and supply of goats. The report having been adopted,

Gen. Burnaby, M.P., spoke strongly in favor of goats' milk. Every village had its invalids and its young folk to bring up, and it was of the greatest importance that they should be able to obtain so health-promoting an article of diet. Not only was the goat one of the nicest and healthiest animals to have in the stable, but if it were wished to cure a kicking horse, this purpose could be easily effected by introducing a goat into the stable.

The President said it might be taken for granted that milk from the goat was very much better than that yielded by the cow, and it was very desirable that means should be taken to overcome the prejudice which existed against goats' milk.

The meeting unanimously approved the proposal to form a Goat Supply Company. It was also resolved to form a deputation to the Privy Council, with a view to obtain the removal of the restrictions now laid upon the importation of goats from abroad, and to urge the advantage of having a port on the east coast for quarantine.

Many noblemen and ladies, as well as those of other rank in England, belong to the Goat Society, and the members and interest in the society are constantly increasing. Kid meat is found as delicate as the finest of lamb; and the milk of the ewes is richer than that of the Channel Islands cows, and what is more important to add, being easier of digestion, it is better for children and invalids. These goats are selected and bred for superior milking qualities, and many a poor family can keep them when unable to support a cow. It is for such, more particularly, that English landlords are promoting the breeding of goats. There are millions of acres of mountainous land in the United States too broken in surface and rocky, or of too poor a soil to support cattle, and yet they are admirable for the support of goats; and the day will come when thousands of these will undoubtedly be found pasturing on these lands, greatly to the profit of their owners.—*National Live Stock Journal.*

Ostrich Farming.—The American Consul at Buenos Ayres renews the suggestion that ostrich farming be undertaken in this country. The destruction of the birds has progressed until the species has become entirely extinct in Arabia, and nearly so in South Africa, while in the Argentine Republic it is now to be found in any considerable numbers only on the extreme western and southern frontiers. The only hope of preserving the bird from becoming extinct like the dodo is in domesticating and propagating it on ostrich farms, as is already done successfully at Cape Town, and has been lately attempted in the Argentine Republic. A range of 6,000 acres, in an open state, will readily subsist and keep 5,000 birds, and this estimate is regarded as too severe; with suitable inclosures the birds cost little to keep, as they thrive on ordinary grass pasturage, although a grain allowance improves the plumage; almost any soil answers, although one containing gravel or small stones is preferable; the birds seldom sicken, graze during the day, require little watering, and lie down to sleep at night wherever they happen to be; they "drive" very readily, need no regular herdsman when properly fenced, breed at four years for the female and five for the male; one pair will hatch out a brood of ten to fifteen four times a year; one egg a day is laid by the female, and when fifteen to twenty are accumulated she sits on them in the day, the male relieving her in the night; forty-two days are required, and if the chicks are removed after hatching, the female at once recommences laying—in this respect being very unlike the common hen. Chicks a month old are worth $50 at Cape Colony. At six to eight months

they are plucked, and at the like interval progressively; mature birds produce twenty-five long white feathers from each wing, worth $5 a piece at Cape Town; chick feathers are worth only $5 per bird, but the next pluckings yield $40 to $150 per bird, and at an assumed average of $75, there will be a gross income of $150 in sixteen months, or about $112 per year per bird; with young and growing birds the least hopeful view must assume at least seventy-five per cent. annual profit from feathers, with also a doubling in value of the birds; the gross income from the chicks produced by one pair is from $2,000 to $3,000 per year. These figures are from the pamphlet of a firm in Buenos Ayres who are importing birds from Cape Town for stocking farms, and must be received with some allowance accordingly; this firm had lately brought in a lot of 200, which came from Cape Town by sail, losing only eight. Prices for imported birds have ranged from $1,000 to $1,250 each for full grown. The bird is, however, long lived; some call it a centenarian, but the usual rule of calculation makes its term twenty-four to thirty years. The Consul says it is a popular error to suppose that the ostrich is adapted chiefly to the desert; probably it took to the desert to escape its many enemies, and experience has so well proved that it will thrive under extreme temperatures that it would evidently like succulent grasses much better than desert fare. At Cape Colony, ostrich farming has now been fourteen years established, and the Consul, who claims to have considerably investigated the subject, says the business ought to thrive, especially in the United States. The tempting figures presented suggest the possibility of overdoing feather production. As to this, he says that the feather exports from Cape Colony fourteen years ago were $350,000 in value, chiefly from wild birds. Now the value is $4,500,000; yet prices have not declined. All the female sex demand the feathers. Present profits are such as make ostrich farmers careless of the distant future; but fear of any collapse in the demand is almost absurd.

The Photographer of the Galloping Horse.—A lecture by Muybridge of Palo Alto at the Royal Institution, with the exhibition of instantaneous photographs illustrating the movements of animals, attracted a distinguished audience, including the Prince and Princess of Wales, the Duke of Edinburgh, Mr. Tennyson, and Mr. Alma-Tadema. His demonstrations of the inaccuracy of much of ancient and modern art, and the contrasts exhibited between conventional and real movements, especially the absurdity of Frith's horses in the picture of Derby Day, excited the keenest interest. The Prince of Wales repeatedly questioned the lecturer, thanking him afterward. The lecture was repeated at the Royal Academy, most of the leading artists being present. The result was that even animal painters were convinced of the novelty and importance of Muybridge's observations.

More of the Cattle Plague.—The name of Augustus Denniston, signed yesterday to a proclamation for the enforcement of the law relative to infectious and contagious diseases in animals, drew attention to the fact that a successor to Gen. M. R. Patrick had been appointed. It appears that Gen. Patrick has not performed the duties of the office for some months, but has accepted and is performing the position of Governor of the National Soldiers' Home of Dayton, Ohio. Meanwhile his deputy, Alexander Orr Hopkins, has acted in his place. Since the law was passed in 1878, 838 infected cattle have been destroyed according to law, and their owners indemnified at an average rate of about $50 a head, which is calculated to be two-thirds the value of the animals. About 500 more cattle have been

destroyed by their owners after it had been discovered that they had been exposed to infection, although the disease had not developed.

When the law was passed the "lung plague" was spreading rapidly. In Blissville, L. I., stables alone there were 240 infected cattle. By the application of vigorous quarantine the disease was almost stamped out. It has recently reappeared in more force, and it was this that induced Gov. Cornell to appoint Mr. Denniston on March 9th. It has been found that there is more or less of the disease in Brooklyn, in Westchester County, and in New York city stables. A herd of thirty-one infected cattle was recently exterminated in Putnam County. A prolific cause of spreading the disease is the habit of sending milch cows from one dairy to another on trial. It is intended to appoint inspectors to search out these cases.

Mr. Denniston was busy yesterday conferring with Superintendent Walling to secure the co-operation of the police, and visiting the Union Stock Yards and other cattle depots. The office will remain at 29 Fulton street, Brooklyn, for the present, and be open in business hours. The permits granted by Gen. Patrick have been revoked, and dealers must take out new ones. What are called "running permits" will be given to regular dealers to convey cattle from New York to Brooklyn, Staten Island, and New Jersey. But in special cases of bringing cattle into the city, separate permits are required. No fee is charged for a permit, for the expenses of the Cattle Commission are paid by the State.

The "lung plague" was known in the days of Aristotle, 380 years before Christ. Its peculiarity is that the lung is solidified by accumulations until, instead of weighing four pounds, the organ weighs over forty pounds. The breathing apparatus is thus made useless. The disease is infectious and contagious, and cattle dying of it are not fit for human food. The disease made its appearance in Holland in 1833, and it is estsmated that the damage by it, in England alone, has been $10,000,000. It first made its appearance in Brooklyn in 1843, in a cow bought by Peter Dunn from a shipmaster. This cow infected the cattle of the west end of Long Island, and thence the disease spread.

Mr. Denniston is from Orange County, where they know something about milch cows. He is a son of ex-State Comptroller Denniston.

Burial-Grounds for Animals. — The proposal which seems to have been made to provide "a burial-place for pet animals, dogs, pussy-cats, and little birds," accessible to Londoners, is, as the *Pall Mall* has justly remarked, not so grotesque as it seems at first. We have known more than one case in which many miles have had to be traveled by the mistress or master of the most faithful companion either had ever had, in order to bury its poor little body at all. Most London houses have no gardens, and most people would shrink from casting the body of a creature of which they had been honestly fond on to the dust-heap, to be taken away by the scavenger. There is even more of the feeling that the body of a dog, a cat, or bird, is identified with the living creature than there is in the case of man, where the almost universal belief in immortality operates to excite a new train of associations in a totally different direction. Still, there are very few who identify the creatures of which they have been fond so completely with the mere bodies of them as to be willing to have them stuffed (as it was said that Jeremy Bentham was stuffed), to mock the memory with a dreadful parody on what they were. Hence, both for rich and poor, some burial-ground is necessary, unless the bodies of the dead favorites are to be spurned as mere garbage—a fate from which even the mildest degree of genuine sentiment necessarily saves them.—*London Spectator*.

FREE-MARTINS.—The twin-heifer born with a bull-calf is commonly called a free-martin, and, as a general rule, is barren. When twins are of the same sex, they breed as well as those not twins; and there are a good many cases of free-martins breeding regularly. But it seems that when a female and male calf are produced together, the female generative organs are generally imperfect, partaking of the character of both sexes. It is generally found that such twin-heifers take on a masculine form, looking more like steers than heifers. The free-martin usually feeds well. The twin bull-calf is a perfect male, and will be as prepotent as if not a twin.—*National Live Stock Journal.*

MONKEYS.—If the skeletons of an orang-outang and a chimpanzee be compared with that of a man, there will be found to be the most wonderful resemblance, together with a very marked diversity. Bone for bone, throughout the whole structure, will be found to agree throughout the general form, position and function, the only absolute differences being that the orang has nine wrist bones, whereas man and the chimpanzee have but eight; and the chimpanzee has thirteen pairs of ribs, whereas the orang, like man, has but twelve. With these two exceptions the differences are those of shape, proportion and direction only, though the resulting differences in the external form and motions are very considerable. The greatest of these are that the feet of the anthropoid or man-like apes, as well as those of all monkeys, are formed like hands, with large opposable thumbs fitted to grasp the branches of trees but unsuitable for erect walking, while the hands have weak small thumbs but very long and powerful fingers, forming a hook rather than a hand, adapted for climbing up trees and suspending the whole weight from horizontal branches. The almost complete identity of the skeleton, however, and the close similarity of the muscles and of all the external organs, have produced that striking and ludicrous resemblance to man which every one recognizes in these higher apes and, in a less degree, in the whole monkey tribe; the face and features, the motions, attitudes and gestures being often a strange caricature of humanity. Let us, then, examine a little more closely in what the resemblance consists, and how far, and to what extent, these animals really differ from us. Besides the face, which is often wonderfully human—although the absence of any protuberant nose gives it often a curiously infantile aspect—monkeys, and especially apes, resemble us more closely in the hand and arm. The hand has well-formed fingers and nails, and the skin of the palm is lined and furrowed like our own. The thumb is, however, smaller and weaker than our own, and is not so much used in taking hold of anything. The monkey's hand is, therefore, not so well adapted as that of man for a variety of purposes, and cannot be applied with such precision in holding small objects, while it is unsuitable for performing delicate operations, such as tying a knot or writing with a pen. A monkey does not take hold of his nuts with his forefinger and thumb as we do, but grasps it between the fingers and the palm in a clumsy way, just as a baby does before it has acquired the proper use of its hand. Two groups of monkeys—one in Africa and one in South America—have no thumbs on their hands, and yet they do not seem to be in any respect inferior to other kinds which have it. In most of the American monkeys the thumb bends in the same direction as the fingers, and in none is it so perfectly formed as our thumbs are. This shows that the hand of the monkey is, both structurally and functionally, a very different and very inferior

organ to that of man, since it is not applied to similar purposes, nor is it capable of being so applied. When we look at the feet of monkeys we find a still greater difference, for these have much larger and more opposable thumbs, and are therefore more like our hands; and this is the case with all monkeys, so that even those which have no thumbs on their hands, or have them small and weak and parallel with the fingers, have always large and well-formed thumbs on their feet. It was on account of this peculiarity that the great French naturalist, Cuvier, named the whole group of monkeys Quadrumana, or four-handed animals, because, besides the two hands on their fore-limbs, they have also two hands in place of feet on their hind limbs. Modern naturalists have given up the use of this term, because they say that the hind extremities of all monkeys are really feet, only those feet are shaped like hands; but this is a point of anatomy, or rather of nomenclature, which we need not here discuss.—*Contemporary Review.*

② THE JOURNAL

OF

COMPARATIVE MEDICINE AND SURGERY.

VOL. III. JULY, 1882. No. 3.

ORIGINAL COMMUNICATIONS.

ART. XIV.—TUBERCULOSIS IN MEN AND ANIMALS: A STUDY IN COMPARATIVE PATHOLOGY.

BY THOMAS E. SATTERTHWAITE, M.D.

II.

IN the year 1867, while Villemin was engaged in the study of tuberculosis, but before he had published his volume, Dr. Petroff, of Kasan, in Russia, made an interesting communication bearing on the infective property of tubercle. It appears that a medical student was admitted into his hospital ward, and a diagnosis of cheesy pneumonia was made, probably in conformity with the notion that it is identical with catarrhal phthisis. The patient died, and at the post mortem examination, cavities were found in the lungs, with miliary tubercles about them, while the lung tissues intermediate between the tubercles had undergone more or less cheesy change. The disease had also attacked the liver, bronchial and mesenteric glands, and Peyer's patches. Desirous of testing the infective qualities of these lesions, Dr. Petroff* took some morsels from the cheesy deposits, and, after triturating them thoroughly in distilled water, injected into the pleural cavities of a guinea pig some of the questionable material. The animal died after

* *Petroff.* Virchow's Archiv., 44, p. 129. 1868.

a lapse of twenty days, and *post mortem* examination disclosed that the pleuræ and exocardium were rough and injected, while the lungs contained miliary tubercles.

A little later in the following year, Klebs* came to the assistance of Villemin, and offered further evidence favoring his theory that tubercle is the product of a special infection. Experiments on animals had resulted in causing an eruption of tubercles in very many instances, and the minute structure of the granules was held by him to be different in quality from those produced in the same situations by the injection of ordinary inorganic substances (quicksilver, cinnabar, etc.). He therefore placed himself in opposition to the later conclusions of Lebert † and Wyss ‡ and those of Waldenburg.§ The latter observer had already shown|| that the so-called artificial miliary tuberculosis could be produced by various matters—even bits of alcoholic specimens, boiled tissues, and pulverized aniline dyes.

Langhans ¶ now contributed a small item to the increasing fund of information. He found by experimenting on rabbits that a serious error had probably been committed by Villemin, which lay in the fact that he had not "controlled" his experiments—in other words, he had not studied the condition of other like animals under a similar restraint. The result of this simple but very natural observation discovered to him that rabbits often have caseous deposits in their livers, which may be due to the encysted ova of strongyles (species of round worms that are frequently found in our native hog, and are commonly known as lung worms), perhaps to the calcified remains of other parasites in their mature or larval forms. **

In the same year Virchow helped to throw some light on the matter, for he indicated that scrofulosis, by which he seems to have meant, at that time, caseation of the lymphatic glands, was in some way closely related to tubercle, the former disease in some way afford-

* *Klebs.* Virchow's Archives, 44, p 242. 1868.

† *Lebert.* Gaz. Med. de Paris, No. —, p. 127. 1868.

‡ *Lebert and Wyss* Virchow's Arch., 40, p. 532. 1867.

§ *Waldenburg.* Berl. Klin. Woch., 51 and 52 1867.

|| *Waldenburg.* Loc Cit.

¶ *Langhans.* Die Uebertragung der Tuberculose auf Kaninchen.

** The writer's experience in animal experimentation goes to show that the ova of parasites are frequently found in the livers of rabbits, while calcified echinococcus cysts are by no means rare, especially in such animals as are bred in the cities, and fed on slops.

ing favorable conditions for the development of tubercle, but he hesitated to affirm that there was any causal relation between the two, because in some instances of tuberculosis no caseation of glands could be found after the most diligent search. They therefore merited the term *idiopathic*.

In the following year Gerlach,* a Professor in the Veterinary College of Berlin, announced certain doctrines which, emanating from so distinguished a source, received very favorable consideration. He had inoculated horses, horned cattle, goats, sheep, hogs, dogs, and rabbits with phthisical matter from men and monkeys, having also "controlled" his experiments by using other substances of various kinds. In the one series of experiments, miliary tubercles occurred very frequently, chiefly or certainly in rabbits; in the other series, where non-tuberculous matter was inoculated, no eruption of tubercles was observed. It will be noticed that now we come to an opposition of recorded facts, Gerlach claiming that non-tuberculous matter will not produce miliary tuberculosis, and Waldenburg claiming with equal positiveness that it may; both of these well-known men basing their conclusions on personal experiments.

The disease, according to Gerlach, was certainly transmitted to rabbits, and as it arose through a traumatism, spreading centrifugally, it should be called infective, as Villemin has claimed. Still the production of the artificial disease was accomplished through the caseation of the lymphatic glands in the neighborhood of the wound, and it was from and through them that the eruption ensued. Two main objections are now, very naturally, raised against these conclusions, and they are: First, that rabbits† are not adapted for advancing the settlement of the tuberculosis question, not only for reasons already named, but because there is excellent ground‡ for believing that any continued inflammatory process is likely to set up caseation, when an organic substance, whether in substance or solution, is inoculated beneath the skin. A very important and practical matter that Gerlach also laid emphasis upon, was the assertion that the ingestion of either meat or milk from tuberculous cows will develop tuberculosis in the human kind. He accordingly advocated stringent police sur-

* *Gerlach.* Virchow's Archiv., 51, p 290, 1870.

† The same objections apply to guinea-pigs.

‡ *Curtis and Satterthwaite.* Report of Investigations as to the Pathogeny of Diphtheria, p. 4, et seq., Bd. of Health Report, N. Y., 1877.

veillance over establishments where cattle were slaughtered, or where cows were kept for milking purposes.

But it was felt that these statements were in need of further consideration, and Orth,* a well-known pathologist, a pupil of Virchow and Rindfleisch, undertook an elaborate series of experiments to throw more light on the matter. It was even held to be problematical whether tuberculosis of the human family is the same disease as bovine tuberculosis (*perlsucht, pommeliere*), as claimed by Gerlach; for although so maintained by those who had enjoyed ample opportunity for its study (Colin † and others), both in Germany and France, it was also strongly urged, on the other hand, that both the physical characters of the lesions and the clinical history were different. To determine this matter, Orth selected a number of rabbits that gave the usual appearances of sound health. In this way he hoped to escape the danger of having accidentally selected tuberculous animals. Fifteen of them were fed with pearl matter from the lungs of tuberculous cows. On killing the rabbits subsequently, he found generalized miliary tuberculosis. Other rabbits were fed on human tubercle, but the results were negative. Positive results affected the lungs chiefly, and the types were either the gray or yellow granulations of Laennec. In some instances, cavities were found. These conclusions seem now to us rather remarkable, for in the first place tuberculosis, if it occurred, should most naturally have attacked the alimentary tract by preference, since it was by this channel that the diseased substance entered the system; and secondly, it appears strange that the human tubercle, which is conceded to be as poisonous as the bovine, should have produced no result. Still, if he could have demonstrated satisfactorily that the animals were sound before experiment, and subjected to the same conditions as in the second series, the proof of infection was strong. Especially interesting was the fact that the tuberculosis of his rabbits was similar in all respects to the human, though in the horned cattle the so-called tubercles were pedunculated rather than sessile (human), and yet they had each of them at first the same pearly lustre, and each little granulum subsequently a yellow centre, which had become caseous. In the kidneys, where the nodules are usually seen to good advantage, though by no means frequently, Orth found that the microscopic

* *Orth.* Volkmann's Sammlung, 64, 1873.

† *Colin.* Aufrecht in Schmidt's Jahrb., 144, p. 223, 1869.

appearances were the same precisely as those observed in the human family. There was the same tendency to organization of the separate granula, while injections of Berlin blue demonstrated that the little vessels of the tubercle were not pervious. Some of the granulations had a reticulated structure, and the small rounded corpuscular elements, but without giant-cells; others had giant-cells. The disease also attacked the liver, spleen, mucous surfaces and omentum. The debated question as to the infective quality of the virus seemed, therefore, to be more firmly established than ever, and Gerlach's conclusions upon this subject were confirmed.

Still later, Prof. Schueppel,* of Tuebingen, reported a series of experiments from which it was concluded that "perlsucht" is the same histologically, and in its life-history, as human tuberculosis.

In the confusion of ideas which had now arisen from the fact that there was a difference of opinion as to the histological constitution of a miliary tubercle, it became essential to restudy the matter, and determine whether, by a new method of animal experimentation, the truth of the matter might be reached. Accordingly, Schottelius † performed a new series of experiments in close imitation of what was presumed to be the natural method of contracting the disease, i.e., through the air passages. He used dogs and rabbits, the latter being, as we have already shown, peculiarly susceptible to tubercle. The first step in his procedure consisted in performing tracheotomy, which he found exerted no unfavorable effect on the lungs. Next he instituted controlling experiments, to determine the effect of such foreign substances as pulverized coal, cinnabar, precipitated Berlin blue, dried and pulverized pus from a psoas abscess, fæcal matter and mould fungi, when lodged in the remotest divisions of the air passages. He concluded from these studies that ordinary *mechanical irritants* had no unfavorable influence on the lungs, at least in the way of producing tuberculosis. In fact, he maintained that even organic substances which do not suffer physical deterioration may be introduced into the lungs in large quantities and yet cause no profound disturbance. On the other hand, he found that a solution of organic substances that undergo decomposition invariably initiates processes that may bear a strong resemblance to those that are called phthisical. It is to be observed

* *Schueppel.* Virchow's Archiv., 56, p. 38, 1872

† *Schottelius.* Virchow's Archiv., 73, p. 524. 1878.

that Schottelius* was careful in his phraseology, and the reasons for his caution became apparent when in a subsequent communication, he plainly insisted that phthisical granulations (miliary tubercles) might be mistaken either (1) for minute capillary pneumonias, or (2) for bodies caught in the lymphatic system between the alveoli, or (3) for occluded bronchioles.

Investigations in this new department of pathological research were now actively prosecuted, and Tappeiner, of Meran, who had been for some years associated with this movement, published his conclusions in 1879,† embodying work done under the supervision of Prof. Von Buhl, of Munich. Taking dogs as his subjects, he subjected them to an atmosphere laden with phthisical sputum in a state of minute division, and forced them to inhale it constantly from twenty-five to fifty-one days. At post-mortem examination they were invariably found to have miliary tuberculosis, chiefly in the lungs, but also in other organs.

Schottelius‡ finally repeated Tappeiner's experiments, but forced the animals (also dogs), to respire an atmosphere laden with various organic substances in a state of fine division (bronchitic sputum, Limburger cheese, powdered brain), and his results in this series were precisely the same as at first. These two observers, therefore, claimed diametrically different results in two series of experiments that seemed to be practically alike. As further opposed to Tappeiner, the experiments of Wargunin, though of recent date, may be noted.§ Acting under the direction of Prof. Rajewski, he took sixteen dogs and submitted them to the following tests: Some were forced to inhale a vapor which contained phthisical sputa; others, on the other hand, inhaled a similar vapor, but laden either with emphysematous sputa, meal, Schweizer käse, or disinfected tuberculous sputa. The result was always the same in quality, the findings varying only in grade, which bore a direct relation to the duration of time between the date of the experiment and the killing of the animal.

In each that was examined the pleuræ and lungs contained firm translucent tubercles, that measured about two millim. (1-15 inch) in breadth. The mucous membrane of the larynx and bronchi was

* *Schottelius.* Virchow's Archiv., 73, p. 574. 1878.

† *Tappeiner.* Virchow's Archiv., 74, p. 397. 1879.

‡ *Schottelius.* Med. Central, b'. 3. 1878.

§ *Vratsch.* No. 6, All. Med. Central bl. Apr. 8, 1882.

intact. Microscopic examination also showed that the process began in the finest bronchioles, and then spread to the adjacent alveoli. This secondary process was catarrhal in its nature, and, extending to the bronchioles, occluded them with granulation tissue, that ultimately tended to the development of connective substance. This process, therefore suggested the desquamative pneumonia of Buhl. The tubercles were devoid of vessels and tended to central caseation. The whole process resembling that of tuberculosis, should, he thinks, not be mistaken for tubercular phthisis, but be accredited to mechanical irritation. Recovery ensued, as was shown by several post-mortem examinations, after a lapse of some months.

The later conclusions of Tappeiner appear to define more closely his views on the infectiousness of the disease. Thus repeated experiments on dogs, in which they were fed with tuberculous sputa, failed to develop lesions of the intestinal tract. He believes, therefore, that the disease does not enter in this way, nor does he think that the ordinary liquid sputum of phthisical persons conveys the disease, as experiments on rabbits showed. But being convinced that it is contagious, he thinks it is inhaled in the dry dust of rooms. (*Deutsch Archiv. of Klin. Med.*, *29. All. Med. Central Zeitung.*)

The views of Rindfleisch,* which are appropriately introduced at this point, give some sort of an explanation of these seeming differences, and they are worthy of record because his teachings and writings have introduced him to a large and interested circle, both abroad and in this country. He finds three varieties of miliary tubercle, if I understand him correctly.

One is the peculiar tubercle that occurs in the artificial disease of guinea-pigs, the second is the fibroid of syphilis, and the third is the lymphadenoid, notably of scrofulous persons, and containing the peculiar epitheloid bodies known as "Schueppel's corpuscles." The term "miliary" he rejects, for the reason that they are not always or generally the size of a millet seed, but often as large as a pea, or even larger. They are made up of minute spherules (submiliary bodies), which have a diameter varying between one-fifth and one-seventh millim. (1-150th to 1-210th of an inch). The epitheloid bodies (Schueppel's) are the swollen and granular connective tissue corpuscles of the connective tissue trabeculæ, and the bloodlessness of the gran-

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* *Rindfleisch.* Ziemmsen's Cyclopæd.. Am. ed., v. p. 642.

ulum is due to the involvement and obliteration of the blood-vessels or lymphatics. In the subsequent retrograde metamorphosis that these nodules undergo, centres of infection are developed which poison the adjacent tissue and give rise to other granules similar to themselves in character.

This explains how tubercularization may spread from caseous centres centrifugally into the parts immediately surrounding them, but fails to account for systemic infection. Ponfick had noted a single instance where ulceration into the thoracic duct had taken place, but such an accident would naturally be rare. Weigert,* however, has suggested another way, and cited three cases of his own to prove it. In these, ulceration and perforation of a pulmonary vein took place, so that it became comprehensible how the infecting matter might be carried to the left side of the heart and then distributed through the arterial system to any part of the body.

According to Rindfleisch,† the initial tubercle is placed in the walls of the very smallest bronchiole, just where it enters the vesicle, and, of course, in the connective tissue septum. But to understand the matter thoroughly, it is well to study the minute structure of the human lung, which is a very complex affair as compared with this organ in many of the lower animals. In the first place, it is made up of lobules, bound firmly together by connective tissue. These lobules contain from two to twenty acini or lobulettes‡ (Waters), each supplied with a terminal bronchus or bronchiole, which divides into short canals, the alveolar passages, three in number for each acinus. The secondary branches which the alveolar passages give off are called infundibula. Both the infundibula and the alveolar passages and their termini are ballooned out with little sacs closely disposed side by side and known as alveoli or air vesicles. The first lesion in pulmonary tuberculosis consists in a nodular infiltration of every angle and point, where the bronchiole meets the acinus. Each nodule increasing in size, they gradually near one another, and finally meeting, constitute by their agglomeration miliary tubercles, and the internal conformation of each varies according to the number and size of the submiliary bodies of which they are composed.

Before closing this part of our subject it is well to notice a plan

* *Weigert.* Virchow's Arch.v., 77, p. 269. 1879.

† *Loc. Cit.*

‡ *Westbrook* Satterthwaite's Manual of Histology. 1881.

that has been suggested recently by Martin* to prove that an eruption is *true* rather than *false*. He claims that, the microscope having failed, he can determine it by *serial inoculation*. While the artificial or false tubercle will die out in one generation, the true will continue in vigor and even increase in intensity by successive inoculations. A true tubercle will produce generalizations of the disease—a false will not.

In this connection also a very interesting and suggestive case has been published by Dr. J. R. Wolfe,† in which, following a blow, a little tumor formed in the upper segment of the iris. It was removed by operation, but the wound did not heal kindly, and finally the eye was enucleated. On microscopic examination, the iris and ciliary body were found studded with tubercles, showing in their centres giant cells. In this instance, the tubercles followed a blow, and the child was subsequently found to be cachectic, while indolent, ichorrous ulcers developing on both legs. The teachings of this incident would seem to be, that the traumatism developed the tubercles, and that it subsequently became generalized; or, possibly, that the condition of the patient determined the inflammation to be tubercular. In either case, the traumatism seems to have been the exciting cause.

Having thus enumerated the principal views that have been held during the past ten years, by those who have devoted their attention to tuberculosis from the standpoint of pathological histology, it will not be amiss to conclude with those of Ziegler,‡ whose excellent pathological manual is a model of judicious personal work.

Tubercle (miliary) he holds to be a non-vascular cellular nodule that develops until it attains a certain size, and undergoes caseation. Usually giant cells are found in the centre of each granulum, and their nuclei are either disposed peripherically in the corpuscle, or at one of its extremities. The mononuclear elements are in part lymphoid corpuscles, in part endothelial or epithelial bodies (Schueppel's epitheloid corpuscles). These two latter varieties are coarsely granular as compared with the finely granular lymphoid bodies. Now, these giant cells and epotheloid corpuscles may, according to Ziegler, be found in ordinary granulation tissue,or as the result of the coalescence of epithelial bodies, but neither they nor any other textural elements are charac-

* *Martin*. Rev. de Med., No. 4. p. 290. 1882.

† *Wolfe*. Brit. Med. Jl., Mar. 4, 1882.

‡ *Ziegler*. Lehrb. d. allg. u. spec. Path. Anat., 1. p. 156 et seq.

teristic of tubercle. In fact, adjacent tubercles will exhibit one or other of these peculiar bodies or no one of them. They are, however, specially prone to exist in tubercular neoplasms, and constitute features that peculiarly distinguish them. Yet precisely the same appearances may be found in artificial tuberculosis produced by mechanical irritants, or in the nodules (tubercles) of Lupus.

And still in these two affections the clinical phenomena are so very distinct and different, that from a practical point of view, the histological similarity of the lesions leads to no confusion. It is important, however, to note this resemblance, which offers corroborative proof that there is nothing distinctive in the minute structure of the granulum. If, then, we regard this miliary body as the product of inflammation, we may very naturally connect it with other inflammatory phenomena, and as such it has long been classed by the laity. But what causes this peculiar phase of inflammation, and why are certain individuals selected? Unfortunately, we seem to be far from having the means of settling the question. Cohnheim desponded of ever obtaining any satisfaction in the inquiry. Rindfleisch referred it to a scrofulous tendency, while Koch* and others have proclaimed that the agent is a microphyte.

It is well to remember, however, that phthisis is governed by certain laws that are generally recognized and have been deduced from the most elaborate series of statistics. For instance, it is known that it usually attacks certain families by preference, selecting those members that have not been favored by the best physical development, or whose nutrition has been retarded by harmful conditions, such as bad air or food; that it elects certain periods of life for its visitation, the first most dangerous period being between the fourth and seventh year of life, and the second between the fifteenth and twenty-fifth, while after thirty-five the susceptibility diminishes; it has a

* In a recent number of the *Berl. Klin. Woch.* (No. 15, 1882), Robert Koch, whose name has for some years back been associated with the study of infective diseases, chiefly in relation to their etiology, has published a full description of the parasite that he finds associated with tubercle. He has performed a very large number of experiments, employed new dyes to differentiate the bacteria, and has propagated them (according to his description) by methods that appear calculated to produce accurate results. It is too early now to decide as to the value of the experiments, though it is proper to say the writer has not as yet been able to verify his conclusions, in some preliminary experiments that have been made.

marked tendency to break out in scrofulous* persons, and occur as a sequel to the bronchitis of measles or whooping cough and the pneumonia of diabetes mellitus.

But why do not ordinary attacks of pneumonia or bronchitis produce it? If, as Rindfleisch claims, it comes from a caseous centre such as the inspissated pus from a catarrh in the apex, how does it happen that these products often lie dormant in the body, and yet no tuberculosis results. To one who has made many post-mortem examinations this is notoriously a fact. What, then, is the agent that determines this special train of symptoms? Is the cause to be found inside or outside of the body?

Now, it is a rule, in such inflammations, that blood-vessels are not developed, so that there is no effort made toward restoration of the part, but rather towards its destruction, through the coalescence of the cellular elements and the infiltrated tissue, which together combine to form a cheesy *focus*.

We have seen in the preceding account of tubercle and its allied manifestations, in the human subject, that our modern idea of pulmonary, laryngeal and renal phthisis relegate the fundamental lesions to tubercle, of which the first chronological factor is the gray granulation of Laennec or of Bayle, which has as a striking peculiarity, a central caseation. Accordingly adenoid tissue, which at one time was held to represent the anatomical structure of tubercle, has ceased to have its former prominence, while the giant cells and Schueppel's epitheloid corpuscles have equally with the former failed to indicate pathognomonic formations, and this simply because the later revelations of the microscope have taught that giant cells are found in a variety of other situations, and because the epitheloid corpuscles may indicate merely the swollen or otherwise altered conditions of the ordinary connective tissue corpuscle, less probably the swollen leucocytes (Cohnheim).†

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* Our modern definition of scrofula dates from the descriptions of Virchow and Rindfleisch, and indicates a habit of the body in which there is a peculiar variety of inflammation. The localities most affected are the mucous membranes and the lymphatic glands, although the bones, joints and skin are often selected. Such inflammations are mainly characterized by their protracted duration and a local infiltration, with a tendency to fatty metamorphosis and death of the part through the medium of a caseous change. The connective tissue elements cause the infiltration, by swelling to an unnatural size and becoming fatty

† *Cohnheim.* Aufrecht in Schmidt's Jahrb., 184, p. 291.

And now we come to the question of pearl disease and the tuberculosis of animals and their relations to human pulmonary consumption. First of all, these animals are not equally susceptible to tubercle. Some, such as dogs and cats more especially, have no tendency to it. Crisp,* who has enjoyed unusual facilities in collecting data on this point, says that he has met with tubercle in more than one hundred different specimens of animals, quadrupeds, birds and reptiles. On the other hand, he has never seen the disease among invertebrates, but in fishes has seen fibrous tumors showing caseation at their centers. In reptiles, especially the orchidians, he has frequently f und tubercles In birds, such as the domestic poultry, he had found collections of cells about the smaller branches of the portal vein and about the malpighian corpuscles of the spleen. They softened and finally became cretaceous, and when removed from the body had a stony hardness. In some birds they resembled the disease in quadrupeds. In mammals, especially the quadrumana, he found that the disease resembled the human variety, though the livers and spleens were more often attacked than the lungs. But vegetable-feeders were most prone to phthisis. Captivity, also, has undoubtedly some important influence on all animals, as menageries and zoological gardens show. Fleming quotes Cruzel, who states that in 100 old and fattened oxen fully one-half were found, when slaughtered, to be tuberculous, while in cows the proportion that were unaffected was very small. So, according to Lafosse, Professor in the Toulouse School, animals used for agriculture or for breeding escape the disease, as also those who have to yield milk for a short time only, while, on the other hand, excessive and long continued lactation promotes it. But probably the proportion of tuberculous animals varies much with the locality, for, according to Creighton, of oxen slaughtered in Augsburg in 1877, only 2.6 per cent., and of cows only 4.75 per cent. had tubercles. The peculiarities of this disease, which most observers declare to be identical with the human tuberculosis, are that it is deposited in enormous massess throughout the organism, including not only the lungs, but the liver, spleen, kidneys and mesenteric glands. Rarely they are found in the muscles.

To determine the identity or non-identity of the two, the following anecdote is related.† On July 26th, a handsome and well-developed

* *Crisp* Trans. of the Path. Soc. of London, 1873. p 346.
†*Klebs.* Virchow's Archiv. 49, p. 29. 1870.

calf, four weeks old, was inoculated beneath the skin of the belly with human tubercular matter in solution. On October 22d following, the animal was killed, and the great omentum, with a considerable portion of the stomach, were covered with pedunculated bodies, in which there was a central calcareous mass, that had all the histological characters of the pearl bodies. Professor Chauveau, of the Lyons Veterinary School, reached a similar conclusion as to the identity of the two diseases by a different method. Having suspected that *ingested* virus was capable of producing the disease, he selected four calves, and compelled three to swallow each about thirty grammes (one ounce) of tuberculous matter from an old phthisical cow. Of these, two were killed fifty-two days later, and in one *carreau* (mesenteric phthisis) was exceedingly well marked. Some of the mesenteric glands were as large as one's fist, and the intestinal eruption was very distinct. The liver, spleen and kidneys were not affected. Gray and "crude" tubercles were numerous in the lungs and bronchial glands. The cervical and submaxillaries were also involved and ulcers were found in the larynx. The second calf was in some respects similarly affected, except that laryngeal phthisis was absent and the intestinal eruption was less pronounced. Chauveau states as the result of his experimentation, that bovine animals contract tuberculosis through the infection of *digestive indigestion*, as they may take anthrax and vaccinia, as sheep take variola, as solipeds take glanders, and as men take small-pox. He therefore holds to the view that tuberculosis is contagious. Leisering, of the Dresden Veterinary School, further sustained these views by the results of his experiments on a sheep fed for three days upon the tuberculous lymphathic glands of a cow. The sheep was killed on the fifth day, and the lungs, bronchial glands, liver and intestinal mucous membrane were found ulcerated and studded at various points with small tuberculous tumors.

Zürn, of the Jena Veterinary School, fed pigs (which are not specially prone to tubercles) first with the milk and then with the meat of a phthisical cow, and claimed that he produced various degrees of tuberculosis. According to Fleming, an old observer, Cruzel, already alluded to, noticed that there was a tendency for animals to become tuberculous when they cohabited, *i.e.*, occupied the same or adjacent quarters. Viseur, of Arras, also quoted by Fleming, noted the same thing. Zundel, of Alsace, noted this in the hardy Swiss cattle who, in association with other phthisical cattle, would succumb

while others, less well cared for, but not so exposed, would remain healthy for years. Grad, a veterinary surgeon of Alsace, furnished some very satisfactory evidence pointing to the same source of the disease. During a twenty-five years' experience he had always doubted the contagious or infectious quality of tubercular virus, but supposed that it should be regarded as an hereditary disease, similar to congenital syphilis. But though he had known five animals occupying the same stall in succession to be taken with cough and die of consumption, he was inclined to think it a matter of coincidence only. However, being urged to test the point, a young and healthy cow, three years old, with no hereditary history of tubercle, was selected, and placed in the stall. After calving, a short cough set in, and in twelve months phthisis was well developed.

The proof that there was a contagious element present in that particular locality was further strengthened by the observed fact that after the stall had been thoroughly cleansed and disinfected, tuberculosis did not again occur in it. The somewhat radical views of Prof. Gerlach now deserve mention, as they gave impetus to much of the work recently done under the auspices of various continental governments. He stated, as the result of his personal experience: That tuberculosis in cattle is very infectious. That tubercles covering the serous membranes, or any organs, are as infectious and produce the same tubercles as the tuberculous matter of the lungs. That pulmonary tuberculosis in cattle is identical with that of the human family. Infection can be produced by inoculation or by ingestion of tuberculous matter. The flesh of tuberculous animals has the power of setting up tuberculosis, when ingested, though with less intensity * than when inoculated.

Fleming, after recording these views, adds there is every reason to view with grave suspicion the use of flesh from phthisical cattle, especially if the disease be much advanced and the tissues generally are involved. But with more reason the milk from cows affected with tuberculosis should be prohibited, particularly when given to infants, who mainly rely upon this kind of food for their nourishment, and whose powers of absorption are very active. Even if such milk did not possess dangerous infective qualities, its deficiency in nitrogenous elements, fat and sugar, and the increased proportion of earthy salts,

* Op. Cit., p. 486.

would render it objectionable as an article of diet. It has long been known that it was liable to produce diarrhœa and debility in infants; but though many children fed on such milk have died from general or localized tuberculosis, the part probably played by this food in its production has not been suspected. One of the first matters to be taken into consideration at this point is a reconsideration of the question whether bovine tuberculosis is essentially the same disease in kind as the human form.

Now, it may be said at the outset that it differs in its morphology and also in its mode of development. The tuberculosis of man tends to become caseous, in cattle to be cretaceous. The cretaceous change follows the caseous in the human family, and is a rarity. The caseous change is a rarity in animals. Ulcers and cavities (vomicæ) are characteristic appearances in the human disease; they occur rarely, if at all, in the animal variety.

The little centres of disease grow by the deposit of cretaceous matter in concentric layers until the pulmonary lobule is distended to many times its normal size, so that at length in some cases it bursts through the boundaries of the lobule and unites with a similarly extending deposit in an adjacent lobule, the two forming a yellow tumor of stony hardness. Meanwhile the inter-lobular tissue is filled with little tumors, usually pedunculated, that vary much in size, each developing a yellow centre. The visceral and parietal layers of the pleura are also covered with similar tumors, which are then known by the name of "grapes," ' angleberries," etc. Now the affected glands develop in a similar way in cattle by "concretive accretion," while in the human kinds they first atrophy before the deposit of lime salts takes place. Virchow,* accordingly, has been inclined to regard the changes as similar to those that attend the development of tumors, and prefers to consider them in the category of the lympho-sarcomata. At this point it is but proper to advert for a moment to the remarkable views of Dr. Charles Creighton,† of Cambridge, England. This observer, in conducting post-mortem examinations on phthisical subjects, was led to think that a certain class could be separated from the ordinary varieties, and these presented certain peculiarities similar to those described in the pearl disease (bovine tuberculosis, *Merlinsigkelt*, *Duckweed*, *Potato Disease*). In the twelve

* *Virchow.* The Monthly Rec. of Med. and Pharm. Feb., 1882.

† *Creighton.* Bovine Tuberculosis in Man. London, 1881.

cases which serve to form the basis of his views, he lays stress upon certain (1) leaf-like or cord-like outgrowths of the pleura and peritoneum; (2) distinctly nodular formations in the lymphatic glands; and (3) the smooth-walled vomicæ or encapsuled nodules. Apropos of these points, it may be said here (1) that the writer's experience in two cases of bovine tuberculosis do not lead him to believe that the "leaf-like or cord-like outgrowths" are distinctive of the bovine disease, and that there is a danger of mistaking cross-sections of terminal bronchial twigs for smooth-walled vomicæ; a criticism which has already been made by one who has authority.

Returning to the danger of infection which some writers claim, it is well to hear from Toussaint,* whose name has latterly been associated with that of Pasteur in the field of pathological investigation. He says:

"I have studied tuberculosis, in its different modes of infection, and I am able to say, after having performed a very long series of experiments upon hogs, rabbits and cats, that no other *contagious disease possesses greater virulence.* The inoculation of a rabbit is followed by results as positive as those obtained from charbon; the same proved true of the other varieties of animals experimented upon.

"In tuberculosis all the fluids of the economy, the nasal mucus, the saliva, the serosity of the tissues and the urine, are virulent and can communicate the disease. Respecting the virus itself, it resists and preserves its action at the temperature which *destroys the bacteria of charbon.*

"If in the human race tuberculosis appears to be less malignant, it is because it often manifests itself in a slow, chronic form, which may last for years, and even sometimes be susceptible of cure; it is, however, none the less redoubtable, and the profession is aware that such cases are so exceptional that they may be counted. Contagion is also very difficult to ascertain, because of the slow appearance of the phenomena.

"The following experiments demonstrate the *resistance of the virus and the danger there is in the employment of meat and the debris of tuberculous animals.*

"By means of a press, I have extracted from the lungs of a cow affected with tuberculosis, presenting an œdema of the anterior lobe,

* *Toussaint.* Monthly Record of Pharm., 1882. (Translation.)

quite a large quantity of juice, containing little virus, almost transparent. Of this I injected 15 grm. under the skin of the inferior portion of the ear of a pig and 10 drops into two rabbits.

"Then I injected the same quantities of this liquid, heated in a water bath from 55 degs. to 58 degs. (Cent.) for ten minutes, in the same region of four hogs and four rabbits.

"These animals having been completely isolated from each other, were kept under observation. I very readily ascertained the development and ordinary march of the disease: local tubercle and hard engorgement of the parotid ganglions.

"General infection occurred very rapidly in every one of these animals; curiously to state, the rabbits which had been inoculated with the heated liquid died before the others.

"One of the hogs was killed two months after the injection had been made; the autopsy revealed a local caseous tubercle, an enormous parotid ganglion, containing at that early date cretaceous points. In the lung a large number of gray granulations were found, and also tubercles in the spleen and liver.

"After the third month a second hog was killed, and at the same time the pig which had been inoculated with the liquid that had not been submitted to the heat. The difference between the lesions of these two animals was very slight; the condition, however, of the latter was more advanced.

"The pulmonary tubercles of the hogs which had been inoculated with the heated juice were afterwards injected into rabbits, which, in their turn, became tuberculous. Two of these latter, killed at the end of the three months, gave evidences of numerous lesions in the lung, spleen, kidneys, and serous membranes.

"Two of the hogs which were inoculated with the heated liquid are still alive. Five months after the operation, however, one of them is almost dead.

"Of the four rabbits inoculated with the heated extract, one died accidently on the thirty-fifth day; the parotid ganglion was found to be caseous, but there was no general infection. The others died of generalized tuberculosis on the one hundred and sixty-fourth to the one hundred and seventieth day; one of them presented highly developed osseous lesions of the anterior members; there was a formation of caseous pus in the articulations of the shoulder and leg, the articular surfaces, and even a portion of the diaphyses were completely destroyed.

"Respecting the rabbits inoculated with the juice which had been heated, one was killed forty-three days after the injection. It presented numerous gray tubercles in the lung and liver. The second, a female, is still living; since its inoculation it has had three litters; of the first, the entire number died the day after their birth; the second consisted of five young, which have, as has also the last litter, been kept in order to ascertain if there is any hereditary taint. As the mother is at this moment affected with a very advanced tuberculosis, it will be interesting to ascertain the successive states through which they will pass.

"2 degs. *Slices of the flesh taken from the thigh of a tuberculous sow were placed upon a chafing-dish and exposed to gas heat;* they were cooked rare, afterwards they were submitted to pressure, and, with the juice obtained, two rabbits were inoculated; two others were injected with the liquid when cold. *These latter died on the twenty-fifth day, almost the same, of a caseous pneumonia and tubercles in all the tissues.*

"Of the two rabbits which were inoculated with the heated juice, one died on the fifty-sixth day, and we found local and ganglionic lesions, gray granulations in the lung, epiploon and the spleen; the other is still alive, but it has emaciated, and death will soon supervene."

Regarding the results of these experiments, it may be said at once that those in which rabbits were used could not be accepted as reliable, and that in any case the results obtained in the hogs did not necessarily indicate any special virulence for the tubercular matter, since it has been proved (Fox, Sanderson, Carter, and Andrew Clark*) that inoculation of any foul organic matter will set up processes that have the gross and minute appearance of tubercle. It is needless to say that these phenomena had previously been observed, and in no way militate for or against the theory of a specific virus in tubercle.

Virchow seems, therefore, to have been justified when he said,† recently, neither "experiments nor clinical observations, up to the present moment, have furnished any decisive facts. We should, there-

* Sir Andrew Clark has found that any kind of *pus* injected into rabbits will produce tubercle. Address at Bellevue Hospital Medical College, Dec. 14, 1878. Med. Rec.

† Mar. 10, 1880.

fore, consider the subject in a state of abeyance; for if one is desirous at present of arriving at a conclusion by comparing the positive and negative results that have been reached—number of positive results and those negative, especially in forgetting that the proportion of animals used for investigative purposes became spontaneously tuberculous is considerable—he must go beyond the facts in the case and abandon himself to his individual frame of mind. It is possible to think that hazard plays an important rôle in the results, and even if we are unwilling to attribute any part to it, nevertheless it is by no means established that we are not in the presence of a characteristic morbid entity of a specific virulence. For one, at least, who cannot recognize the similarity of the tubercles of the bovine race and the caseous products, the results obtained, so incongruous and contradictory, that the idea of positive specific virus does not appear to me to have been yet scientifically demonstrated. Therefore, in the light in which I consider it, experimental investigation should be devoted to ascertaining if, by any alimentation, consisting of different, altered and unwholesome substances, a formation of similar products will not occur in the organism of our domestic animals. Moreover, it is only by including in our researches a very large series of subjects and not isolated cases, as some physicians have done lately, that we will succeed in learning in what proportions pre-existing or coincident affections force the result of the conclusions."

To much the same effect is the report of Prof. Siedamgotzky,* employed by the chancellor of the King of Saxony to inquire "whether and how far the use of the meat and milk of cows which have the pearl disease is baneful to human beings." He reported that his experiments (conducted on hogs and sheep) yielded no result giving any positive support to the statement that tuberculosis can be conveyed to mankind through the milk or meat of tuberculous (pearly) cattle.

The evidence of Law on an allied point is also important. According to him (Nat. Bd. of Health Bull., 40, 1882) we have no satisfactory evidence that tuberculosis has ever been conveyed by bovine lymph. And yet he states that Jersey cattle, which he thinks are especially prone to tubercle, have preference in the selection; and besides, he adds, the cutaneous irritation of induced cow-pox will not

* *Siedamgotsky.* Arch. f. Wiss. und pract. Thier-hlke., March 8, 188 .

only enlarge the adjacent lymph glands, but leave them permanently so, and they will then manifest fever and other evidences of tuberculosis.

In closing this brief and necessarily incomplete review of a subject that has vast practical importance, the writer ventures to formulate certain conclusions that he has derived from his personal experience and a study of the literature of tuberculosis. It will have been observed that the progress made in our elucidation of the nature of tuberculosis has been accomplished mainly through the experiments of the past ten years in comparative pathology. We should, therefore, hope that these researches may be successfully continued until further results are reached which will have still greater practical value, and that we may at length be furnished with weapons for successfully resisting that dreaded disease—consumption.

The following are the conclusions:

1. Tuberculosis is a disease that is hereditary, statistics having abundantly proved that there resides in certain families a greater or less susceptibility to the disease, which usually manifests itself in the pulmonary organs. It generally attacks such individuals as are deficient in physical vigor, whether as the result of traumatism, continued illness, or congenital vice of constitution. It is apt to occur as a sequel to certain diseases, such as measles and whooping-cough, and is antagonized by others, such as empysema or some cardiac affections. Residents in great altitudes are almost exempt; while those who live in warm and moist and exceedingly variable climates are specially prone to it. It is no less true that the precautions taken by intelligent persons who have been in a position to withstand the predisposing causes of the disease, have often enabled them either to escape the disease altogether; or, if it has been contracted, appropriate treatment has enabled them to resist it successfully.

2. The most distinguishing characteristic of tubercle is the occurrence in the tissues, of minute, bright, glistening translucent particles, that have been called miliary tubercles, granula, granulations, etc.

3. They are the result of an inflammatory process, because they can be produced by the introduction of mechanical irritants into the system.

4. When these minute bodies coalesce to form larger bodies and undergo a change of color, they are known as crude or yellow tubercles.

5. Some of them contain the reticulated tissue that is called

adenoid, and resembles most closely the framework of the lymphatic glands. As their age advances, the centre is quite apt to be occupied by a giant-cell, a large multi-nucleated body, whose boundaries and processes are hard to define, because they shade off gradually into the surrounding tissue. In some cases Schueppel's epithelial cells are found, but neither they nor giant-cells are essential elements of tubercle.

6. No region of the body appears to be exempt from them, though the lungs and serous membranes are most frequently known to be attacked.

7. In the gradual development of these bodies they undergo caseous change at the centre, which phenomenon is another marked feature of tubercle. Still, in some instances, we have reason to suppose that the miliary tubercle may become organized, and thus a cure result. There are cases where the tubercle does not exhibit the reticulated structure, but the fibrillated or fibrous, and in these instances it is conjectured that the most favorable issue is to be expected.

8. Tubercles rarely remain long in situ without setting up an additional inflammation, that may best be classed as a pneumonia. It is the *infiltrated tubercle* of Laennec, the *catarrhal pneumonia* of Niemeyer, or the *desquamative pneumonia* of Buhl. It may perhaps be protective in some instances, serving to wall off a caseous process, thus preventing it from becoming disseminated, or it may eventually itself participate in the same process and lead finally to necrosis of the lung and the production of cavities.

9. Tubercles may be confined to a limited area and a single lobe of the lung, or a single lung, or they may be diffused pretty equally in different organs; generalized, disseminated, or secondary tuberculosis is the most dangerous and malignant, and is due to transmission of the disease by the lymphatics or blood vessels, usually the latter. In this secondary form the first manifestations are the gray granulations, as they are also in the primary form.

10. It is not yet certain whether the artificial or false tubercle, produced by the inoculation of non-tuberculous matter, is a local disease merely, incapable of being generalized.

11. Tuberculosis is inoculable and it "breeds true," always producing its kind if it produces anything, but other substances will also in a certain number of cases produce the same results; in fact,

any organic substance that is capable of physical deterioration. It has not been satisfactorily proved that tuberculosis has a specific virus.

12. There is some good evidence going to prove that tubercle is contagious, *i.e.*, that it is capable of propagation by cohabitation, or, in other words, close association with persons that have the disease. The number of well-authenticated instances in the human being where the disease appears to have been spread in this way indicate something more than a coincidence This relation has been shown with a reasonable amount of certainty in horned cattle.

13. And yet bovine tuberculosis differs in some important particulars from the disease in men and many of the lower animals, though it is highly probable that the differences, which are mainly in the pathological appearances, are referable to differences of anatomical structure in the different animals.

14. The evidences that Creighton has brought forward to show that there is in man a special form of tuberculosis similar to that in horned cattle requires further substantiation.

15. From a sanitary standpoint we should discountenance the use of milk or meat from phthisical cows, since if not absolutely infective, they are at least deficient in the proper nutritive elements, and for this reason alone should be excluded from the markets.

16. Though it does not appear that it can be shown that any person has ever been rendered tuberculous through the medium of bovine virus, still when the cattle used for vaccine purposes are slaughtered, those in charge of the farms should examine the viscera of all such cattle before the virus is furnished to physicians, and it should be specially understood that such an examination has been made in every instance where the virus is sold.

17. The parasititic theories of Klebs, Koch and others are still *sub judice.*

ART. XV.—THE EXPANSION AND CONTRACTION OF THE HORSE'S FOOT, AND HOW TO SHOE IT.

BY JOHN N. NAVIN, V.S.

(*Continued.*)

How far I have succeeded in proving that the foot expands and contracts in violent action, that its expansion obviates concussion of its internal sensitive parts, and that the elasticity of the laminæ, and arched form of the sole, and not the frog, contribute to its required expansion and contraction the reader must be his own judge. It does seem to me, indeed, that no man possessing common anatomical or mechanical skill can fail to perceive that a soft elastic organ, such as a healthy frog, is inadequate to the mechanical force requisite to keep a stout wall apart, and at the same time overcome the resistance necessary to lowering the arched form of the sole, which it must do in forcing the wall outward. How much more seemly it is, that the weight of the horse thrown upon the crown of the arched sole, would force its base outwards, thereby expanding the wall, than that a wedge of any kind (which the frog is claimed to be) would, whilst joined firmly to the sole, force the wall apart. I care not what kind of substance the frog may be composed of, be it hard or soft, whilst firmly united to the sole, it has a tendency to push that organ upward, and increase its concave or arched form, therefore contributing more to contracting than expanding the foot when in violent action it strikes the ground.

That the wall expands and contracts no man seems to deny. The entire controversy seems to hinge upon its mode of expansion. Such being the facts, the reader will naturally inquire what kind of shoe, if not the one at present in use, is the one to adopt.

The answer naturally suggests itself. A shoe which gives full protection from wear and tear and permits full and free expansion and contraction of the wall, as the unshod foot possesses.

This inquiry naturally leads to another, viz.: How is the wall constructed, and by what organ or organs is it secreted? On no subject pertaining to the anatomy and physiology of the horse has there been a greater diversity of opinion than that of the production of the wall, from the earliest period to the present day. Some highly educated veterinarians contend that the tubular portion of the foot is

secreted by the coronary border (*which is correct*), but that the connecting matrix and insensible laminæ are secreted by the sensible laminæ; others admit that the insensible laminæ are secreted by the sensible, but that the connecting matrix is secreted by the coronary.

For over twenty-seven years I had been floating between these two theories, having heard lectures and read books advocating both doctrines, until an independent idea struck me, more than twenty years ago, and I concluded to satisfy my mind upon the subject. I therefore went to work to dissect specimens, and no sooner had I established an independent opinion of my own than I cowed under that written by some eminent veterinarian, and feared to assert my own simple opinion against that of distinguished writers; therefore, no sooner would I finish writing up the subject than, when contrasting my theories with those of scientists, my manuscript was consigned to the flames, and I found myself humiliated by my own want of courage. One thought, however, I never could smother, and that was that both theories could not be correct. I therefore concluded that I would contend for my own, which differed from both, and that if the high reputation of either crushed me to the wall, I would be no more annihilated than the third party. So, with fear on one side and ambition on the other, I searched and researched until I satisfied myself that the coronary border secretes not only the tubular portion of the wall, but also the matrix and insensible laminæ, and intend to prove it.

In placing before the public a few of the conflicting opinions of veterinarians, upon the formation and secretion of the wall of the foot, and how and by what organ or organs it is secreted, I beg to call attention to the theory of a distinguished and flowery writer, viz., Joseph Bruce Coleman, M.R.C.V.S., Chicago. In his work on "Pathological Horse-Shoeing," which embraces the anatomy and physiology of the foot, page 39, in speaking of the functions of the coronary ligament, he says: "The locale of the ligament is in the coronary concavity, just inside the superior margin of the wall; it is the principal medium of connection between the skin and hoof; it appears to be transitional in its character, and partaking of the characters of both. Its surface towards the wall is papillated, and each papilla penetrates a horn tube or fibre, of which the fibrous portion of the wall is composed. It is affirmed by one writer (Mr. Fleming) that the entire wall is secreted by this ligament; this, of course, would include the

horny laminæ." I dissent from this opinion for the following reasons: The wall is composed of two kinds of material, the fibrous and non-fibrous matrix, which bind the fibres firmly into the solid mass of horn, which constitutes the wall of the foot. I am not aware of any secreting structure which secretes more than one specific secretion in a healthy acting condition. But if there should be, it would not be sufficient reason for attributing the functions of secreting two such widely different substances as compose the walls to the coronary ligament. Each fibre of the wall is fed by its connecting papilla; besides, we are not left in doubt as to where the matrix comes from. I think it is just as demonstrable as the source of the horny fibres. The vascular laminæ have not merely a mechanical connection with the non-vascular horny laminæ, but a secreting function, and it is from this source that the homogeneous or non-fibrous portion of the wall is derived. If an experimental proof of this is demanded, examples are numerous enough, in cases of false quarter and those cases where the hoof has been torn by violence, and the coronary ligament partially or wholly destroyed. In false quarter, for instance, when the coronary ligament is injured or destroyed, we have but a thin non-fibrous horny secretion composing the quarters, frequently too weak to sustain the weight of the animal, which could come from no other source than the vascular laminæ. Reason—*Versus ipse dixit.* In cases where the entire hoof has been torn off, whilst the vascular laminæ remain otherwise uninjured, a non-fibrous horny material will be deposited all over the sensitive laminæ in a few weeks. Does this come from the coronary ligament? It cannot, as ten or twelve months will scarcely suffice for the growth of horn, from the top to the bottom of the foot. I think these experimental facts too well known to need any further exemplification. Mr. Fleming, in his recent work on horse-shoeing, asserts that the latter is an error, as the microscope, physiology and pathological experience abundantly testify. This is all the refutation he has condescended to give this alleged error. Supposing it to be an error? It can hardly be expected that those accustomed to do their own thinking will weigh the opinions of others for themselves and to rely on their own pathological experience, when they have any, will readily abandon their own opinion, without a single reason being advanced, or a particle of evidence being adduced, to show that they are erroneous, beyond the mere *ipse dixit* of any writer, however he may be an authority in other respects. I repeat, the principal function of

the coronary ligament is to secrete the fibrous portion of the wall. It is extremely vascular and highly elastic. The former quality is necessary to supply the demand of rapid wear and tear, to which the wall is specially subject in the unshod foot, and to maintain the integrity of the structure it secretes, the latter to adapt it to the expansive and contractile movements of the foot when in action, or when weight is superimposed upon or removed from the limb. Although in appearance a thickening of the terminal portion of the skin, it has a peculiar and distinct organization, to adapt it to its very important purposes. The inner layer is a strong white elastic substance, which forms its principal thickness; upon this reposes a numerous accumulation of blood vessels, and external to these a thin coat, from which proceed the secreting villi of the walls. The attachments of these villi in the living structure must be of a powerful nature, as there is no visible connection between the hoof and the skin, excepting the areolar or connective tissue which bind it, but in no especial manner, to all the adjacent structures. The growth of the wall is in every respect similar to the growth of the human nail.

Dr. Dadd, V.S., in his work, pages 28–29, says: "The sensitive laminæ make no addition to the substance or thickness of the wall; they simply produce the horny laminæ along its interior, and as a proof of which, the wall measures as much in the thickness at the place where it quits the coronet as at any other point lower down. Other demonstrations of this fact come every day before such practitioners as have to treat canker, quittor, sand-crack, and other diseases of the feet." Again, at page 30, under the title of "The Coronary Substance," he says: "To revert, for sake of elucidation here, to former description. After the hoof has been detached by a process of maceration or putrefaction, in a perfectly entire and uninjured condition, it presents around its summit a circular groove, bounded in front by a soft whitish substance, having a thin edge, and having a nature between horn and cuticle, and behind by an attenuated margin, more horny in its character, whose thin edge is serrated or denticulated. Into this circular groove or canal is received the terminal margin of the cutis, the cuticulo-horny layer of the hoof in front of it having every appearance of being a continuation of the cuticle. The coronary substance occupies the coronary concavity, formed upon the inside of the superior or coronary border of the wall of the hoof. It is the part constituting the basis of the circular prominence com-

monly distinguished in the living animal as the coronet. It is broader around the toe of the wall, diminishing in breadth towards the quarters and heels, and being somewhat broader around the outer than the inner side. It is thicker in substance around the middle and most prominent parts, growing gradually thinner both above and below." In page 31, he says: "The coronary substance may be ranked amongst the most vascular parts of the body. No gland even possesses, for its magnitude, a greater abundance of blood-vessels, or of blood-vessels of a larger size, nor does there any part exist in which greater care is taken to arrange its vessels so as to insure an uninterrupted supply of blood. *These vessels it is that produce the wall,* and, there is every reason to believe, without any assistance from the vessels of the laminæ." Again, on page 33, writing on the organization of the sensitive laminæ, he says: "All the blood they have occasion for is that which is sufficient only for the secretion of the horny laminæ."

Another distinguished author, Prof. Williams, in his work, page 352, speaking of false quarter: "The horny wall or crust of the foot, being secreted by the coronary substance, it naturally follows that, when part of it is destroyed, the part of the wall below the destroyed portion is no longer supplied with horn from above, and this deficiency causes a chasm or fissure in the wall. It differs from sand-crack very materially, is much wider at its base, and contains a modified condition of horn, viz., the horny laminæ secreted by the sensitive ones, denuded of their outer covering. The coronary band also shows a loss of substance, corresponding to that in the crust."

Again he says, in page 354, quoting that great anatomist, Barlow: "The horn tubes are cemented together by an intertubular substance, composed of cells, and produced from the surface between the papillæ. The wall, consisting of tubes and agglutinating intertubular substance, is secreted by the coronary substance, and is naturally tough. Having seen, then, that the horn is secreted by the papillæ and interpapillary substance, the reader can understand that the brittle condition of the crust, leading to sand-crack, depends upon a perverted condition of the secretory structures."

I find myself widely differing from the theory of each of the above gentlemen, and I shall therefore offer a few arguments and proofs in support of my own, which is, that the horny tubes, connecting matrix, and the horny insensitive laminæ are each secreted, produced by the

coronary ligament, and I think I can prove it to every man of intelligent, perceptive mind. The merest novice will not deny that when the coronary band is divided by violence, it throws out (secretes) a divided wall; then, no matter how small the crack may be, the sensitive laminæ never yet was known to furnish matrix sufficient to unite the edges of the crack; but no sooner is a hot chissel-edged instrument forced through the wall at its junction with the inferior edge of the coronary border, severing the old wall from the border, than the effect of the heated iron swells the tissues, its edges meet, heal, and produce an undivided hoof. This cannot be denied or disproven. I have done it a thousand times. I, like others, have been simple enough to clasp cracked hoofs, but not lately, nor shall I ever do so again. What becomes of those gentlemen's theories, in case where those useful appendages, the lateral cartilages, become inflamed, ossified and enlarged, reaching above and behind the coronet? Does their covering membrane still continue the secretion of the matrix? If so, where does it go to? Certainly not to the hoof, although under those altered conditions the wall appears perfectly formed and fully secreted. Will the advocates of those foolish theories inform me whether the superior part of the laminæ secretes the matrix, or if their whole surfaces, from coronary to sole, do so? If the latter, why does a sand-crack remain divided until it grows down completely? If their theory is correct, it should be filled by the matrix at any point that it touches the laminæ. I shall then refer the reader to both these theories, which vary from my own (which is that the wall, matrix and insensible laminæ are secreted from the coronary substance), and proceed to give a few illustrations to prove my correctness.

Will these gentlemen inform us that the sensitive laminæ upon the lateral cartilage secrets the insensible laminæ and connecting matrix at their superior junction? If they do, away goes their theory. When the ossified cartilage extends behind and above the coronary ligament, it surely cannot secrete in front of the ligament; and if they say that they secrete along their entire length, away goes their theory in cases of laminites, in which the dovetailed junction existing between the sensitive and insensitive laminæ is severed, and the coffin-bone descends upon the sole. Still in both cases the wall continues to be secreted by the coronary border.

I was first prompted to inquire into this matter by observing that

white-legged horses generally have white hoofs, but should they happen to have a black spot in the region of the coronet, a black streak in the hoof below it invariably follows, and *vice versa.*

This is easily accounted for, when we consider the fact, that the middle layer of the skin in which the hair bulbs repose controls the color of the hair, and in white-colored horses the cuticle also. If, then, the coronary is a prolongation of the skin, why should not the complete wall, both its matrix and tubular part, be a prolongation of the coronary. Some time since I treated a black mare suffering from an injury to her coronet and pastern. She had been treated by an empiric; and when I saw her the part was much inflamed and swollen, the coronet divided longitudinally by some sharp body. On reduction of the inflammation, I remarked a shell-like body curling upwards from the coronet; and I found that organ divided in its centre longitudinally about one inch in length, the outer division turned upward, and secreting a well-developed hoof, which I cut down, but the secretion continued, and a subsequent growth revealed a well-developed hoof, presenting both a matrix and tubular secretion. This illustration completely disproves all other theories which cannot be proven on practical observation and experience. When a quittor passes between the wall and os pedis, from sole to coronary, destroying the laminæ, or at least completely severing their connection, will any one tell me the tubular part of the wall alone is secreted under those circumstances? Again, if the sensible laminæ secrete the matrix, how does it find its way through the wall itself, in order to supply its outer part, it being at least three-fourths of an inch in thickness? Again, how is the matrix of the superior and upper portion of the coronary concavity secreted? Surely not by the laminæ, from which it is completely disconnected, but from the coronary above, to which it is immediately connected. I myself have passed a seton through from sole to coronet, and allowed it to remain for some time, and of course severing the laminæ. Where did the matrix come from, then, to supply the wall? Although its substance appeared perfect and continued so for months under my own personal observation. About a year since I treated a case of fistula of the coronet. On introducing the probe, it passed right from the sole to the coronet in an indirect line from above, downwards and forwards. After trying various milder remedies, I removed a V-shaped portion of the wall, next the coronet, exposing the sinus. The depression representing the portion I removed, of

course, remained, until it disappeared in the ordinary way, but no matrix ever appeared to fill it. If the matrix is secreted from the sensitive laminæ, why not perform their functions in this case as well as if the tubular portion were present, and fill at least a portion of the depression? Mr. Coleman argues that no organ in health maintains a double secretion, as a proof that the coronary does not secrete both tubes and matrix of the wall. Can he account for the production of the sole and frog? From what source do they derive their secretion? Surely he cannot claim that the coronet laminæ supply anything to those bodies. Again, he says: "If the entire hoof be torn off the living animal, it becomes covered with a horny secretion from the sensitive laminæ in a few weeks." But he seems to forget that nature is kind, under unlooked-for conditions, and that even bone, when exposed, becomes covered by a protecting membrane. For further convincing proof of my correctness, I refer those gentlemen to that great and well-known anatomist, Chauveau, in his work, "Comparative Anatomy," which I became possessed of only a few weeks since *for the first time,* and I was indeed highly gratified to find that I had such a distinguished author for a reference in my favor. Page 810, on the development of the hoof, he says: "The hoof being a dependency of the epidermis, is developed like it; that is, by the incessant formation of cells, in the layer that corresponds to the rete mucosum, at the expense of the plasma, thrown out by the numerous vessels in the veratogenous membrane. The velvety tissue forms the sole and frog, the perioploic ring the periople, and the coronary cushion the wall. In these different parts the epithelial cells multiply and become flattened in layers parallel to the surface that secretes them, and in proportion as they recede from the surface, so that the wall grows from its superior to its inferior border, and the other two parts of the hoof from its internal to their external face. The villiosities of the coronary cushion and the velvety tissue are the organs around which the epithelial laminæ are grouped, and their presence determines the tubular structure of the horn. Their peculiar function is completed by the exhalation of a peculiar fluid that maintains the flexibility of the hoof, and probably by the development on their surface of the irregular cells which cluster in the interior of the tubes. The leafy tissue in a normal condition *does not concur to any extent in the development of the wall.* The cells covering it are multiplied in describing a downward and forward movement, and though they are cer-

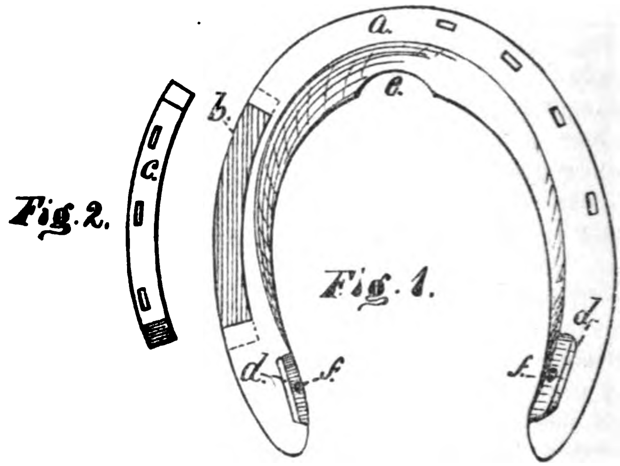
tainly applied to the inner surface of the wall, yet they do not constitute the horny laminæ. The latter are formed from the coronary cushion, at the commencement of the vascular laminæ, and they descend with the wall, in gliding along the surface of the layer of cells, separating them from the latter. This downward movement is facilitated by the multiplication in the same sense of these cells. *This opinion as to the function of the vascular laminæ is based on comparative anatomy, on the presence of some longitudinal tubes in the horny laminæ, and on pathological observations.*

When the podophyllous tissue is inflamed, whether or not it is exposed, its latent activity is quickly manifested, and it rapidly throws out a quantity of hard consistent horn, traversed by tubes which, according to Mr. Gourdon, are directed obliquely backwards. These tubes are more irregular than those of the normal wall and are disposed in parallel series, and are formed around the villo-papillæ developed on the free border of the laminæ. In this horn, produced by the vascular laminæ only, there are never observed between those latter the horny plates of cells sharp and distinct, in the midst of other cells, as those in the wall formed by the coronary cushion. *The horn thrown out on the surface of the podophyllæ, immediately after removal of a fragment of the wall, is not a definite horn, but must be replaced by that from the coronet.* This substitution is complete, as a microscopical examination proves that the wall which descends from the cushion and is furnished with horny laminæ, passes beneath the provisional wall and glides downwards by the combined action already mentioned over the surface of the soft cells of the vascular laminæ, as soon as the latter are covered by the proper wall; then marginal papillæ become atrophied, and they again assume the limited function pertaining to their physiological condition. The quotation is a splendid exposure of Mr. Coleman's so-called "secretion of horn from the sensitive laminæ when the hoof is torn off."

I inclose you the description of my shoe, as set forth in my patent claim.

The objects of my invention are, first, to provide a shoe for horses which can be so fastened to the foot as to allow free play to the natural elasticity of the walls of the hoof, and thus prevent disease of the foot; second, to afford a means of curing or relieving the disease known as "contracted hoof" by spreading the walls of the hoof after the shoe has been placed in position and retaining them in the

desired position; third, to provide a convenient means for securing pads or other appliances in contact with the frog or under side of the foot. I attain these objects by the use of the shoe illustrated in the accompanying drawings.



a is a shoe, of the usual form, in the upper side of which is formed a dovetailed recess, *b*, into which is nicely fitted a separate removable piece, *c*, thus completing the contour of an ordinary shoe. The removable piece *c* is provided with nail-holes, as is also the other side of the shoe, in the usual manner.

d d are upward-projecting lugs, formed upon or welded to the upper surface of the shoe at the heel, and designed to fill loosely the space between the walls of the hoof when the shoe is first secured to the foot. A portion of the shoe is cut away at the toe of the inner edge, at *e*, for the purpose of making the shoe weaker at that point, so that when force is applied between the lugs *d d* to spread that porsion of the shoe apart it will bend at that point, *e*, and not at any intermediate point, the object of this being to prevent any cramping or binding of the removable piece *c* in its recess, and also to secure an equable and proper spreading of the hoof in a case of diseased hoof, as hereinafter explained.

For the purpose of securing to the under side of the foot rubber pads or other appliances used in the treatment of diseased feet, the lugs *d d* are provided with holes *f*. By passing a small rod or wire

through these lugs and the pad or other appliance before the shoe is secured to the foot the pad when applied is securely held in place.

My improved shoe is applied and operates in the following manner: The shoe being fitted to the foot in the usual manner, the position of the removable piece *c* is marked upon the hoof. It is then removed from its recess and nailed to the foot in its proper position. The shoe is then slipped upon the piece *c*, the dovetailed form of which retains that side of the shoe in place, and the other side is then nailed in the usual manner.

When the horse rests upon the foot or strikes a violent blow, as in running, the piece *c* slides in its dovetailed recess, and allows the natural elasticity of the walls of the hoof to operate, thus preventing disease.

If the foot is already in a diseased condition from wearing a stiff, unyielding shoe, and has become contracted, I now apply a suitable lever between the lugs *d d* and spread the shoe, thus bending it at *e* and spreading it permanently, mostly at the heel, diminishing gradually to the toe, and holding the walls of the hoof apart. This being done with care and good judgment leaves the softer portions of the foot free to regain their normal condition and relieves the disease.

ART. XVI.—THE PHYSIOLOGY OF DIGESTION IN RUMINANTS, WITH PRACTICAL REMARKS.

(*Concluded.*)

BY HENRY C. SLEE.

THE LIVER.

The liver in ruminants differs little from that of the horse, the principal distinction being that it is confined to the right side.

The gall-bladder is present in the antelope and the hollow-horned ruminants, but not in the camel or deer. The giraffe has been found with a gall-bladder divided so as to form almost two distinct bladders,

but most giraffes have none at all. The gall-bladder is unaccountably capricious, appears in some animals with simple stomachs, while some with complex stomachs have none.

In some ruminants the bile and pancreatic juice reach the small intestine by separate ducts, as in the cow, in which the bile duct is 25 to 30 inches from the pylorus, and the pancreatic duct some 15 inches lower; in the sheep, goat and giraffe, the ducts join and form one which reaches the intestine 12 to 16 inches from the pylorus.

WATER.

When water is drank the lips of the œsophageal gutter are partially opened and the water goes into the rumen and reticulum, and can be regurgitated in some ruminants without carrying the food with it. The camel, when going long distances, subsists partially upon the fat in his hump. He therefore has no need of water to dissolve or dilute food, and requires only sufficient to moisten his tissues; and he is very economical, even having a duct conveying into his mouth the watery discharges of the nose. He regurgitates the water, which is then caught by the palatal protuberance, and bathes the throat and the root of the tongue. The stag drinks a very small amount of water, sometimes not touching it for two or three months, and to the reindeer water is as great a rarity.

THE DIGESTIVE JUICES.

The *saliva* of ruminants has no ptyalin (which is the ferment having the power of turning into sugar starchy foods in the saliva of man and the horse), hence its only function is to assist in the lubrication of the food and its conveyance into the actively digestive organs; but it is secreted in enormous quantities, a cow secreting an average of 120 pounds in twenty-four hours, while the horse secretes about 80 pounds, which is large compared with the 2 pounds secreted by a man in the same time. This amount varies with the dryness of the food. A pound of dry hay requires 4 pounds of saliva; wet hay, 3 pounds; barley, oats, and similar grains, 2 pounds; while wet meal is swallowed with a small amount of saliva. During the first mastication the amount of saliva secreted is comparatively small, the food being swallowed without a pause in the process of grazing, and passing down the œsophagus in rather dry, hard masses. These striking against the lips of the "gutter," open them and fall into the rumen. Here it is subjected to constant motion, the rumen moving up and

down and forwards and backwards with a kind of "balancing" movement. The papillæ which line the rumen assist the food in its passage through the different compartments, and prevent its moving the other way, as they are erectile and pointing in the direction the food should take. There is no secretion of fluid in this stomach, the food being moistened with water which is taken into the rumen directly by drinking, or indirectly from the cells of the reticulum. There is a considerable rise of temperature in the rumen when it contains food—amounting to 104° F., and a species of fermentation takes place, by which cellulose is partially digested.

When the rumen is full—which, in the cow, requires, on the average, about three hours—the animal seeks a favorable spot in which to lie down and

"RUMINATE."

The process is much easier in this postion than while standing, as the food is pressed up toward the œsophagus. The animal now, by a contraction of the walls of the rumen, which we have seen are movable at will, forces the food past the semilunar valve into the reticulum. And here it has been asserted that the food is formed into pellets in the cells; but there are many reasons why this theory should be doubted, some of which are that the camel, in which these cells are most highly developed, and in the stag, the procese of rumination is much more difficult, apparently, and accomplished with much more exertion than in the goat, in which these cells are less marked; while the giraffe and musk ox have no cells in the reticulum. More probably the reticulum is contracted so as to force the food between the lips of the gutter, which contract bo h lengthwise and circularly upon a portion of the food; and then, by the motion of the œsophageal muscles, assisted by the abdominal muscles and a deep expiratory effort (similar to the process of vomiting in the human), the pellet is thrown into the mouth with considerable force, the large papillæ in the cheeks assisting in catching it. The moment it arrives there, the fluid portion of it is again swallowed, as can be plainly seen in the cow, the process of swallowing always immediately following regurgitation. Very dry food, such as hay, is often regurgitated two or three times before it is sufficiently macerated to pass the gutter, while the greater part of soft mashes is not regurgitated at all; so, by feeding a cow upon such food, we could stop her ruminating almost entirely.

The act of regurgitation seems to be more difficult to some ruminants than to others. In the stag it requires a considerable effort, and in the camel the action of the abdominal muscles seems much greater than in the cow.

Thr cow regurgitates about 2½ ounces of solid food each time, and this is again masticated for about fifty seconds, accompanied by a copious scretion of saliva. In the motion of the jaws during rumination the camel differs from other ruminants—it moves the jaw alternately from left to right, and from right to left, while other ruminants, though moving the jaw both ways, do not alternate, but suit the motion to the position of the food in the mouth. There is so much saliva now mix d with the food that it becomes a semi-liquid mass, and when swallowed again, glides down the œsophagus without opening the lips cf the gutter (which are voluntarily tightened at the same time), and is received into the third stomach. Here it is moved about and pressed between the leaves by the muscular motions, pulverized still further, and formed into a pulp. For the proper action of this stomach a large proportion of fluid is necessary, otherwise the constant rubbing, together with the impaction and fermentation of the food, will produce inflammation; it also requires to be in this form to get out of these leaves into the last stomach; hence we can see the necessity of their being omitted in the camel, who is compelled to be for long periods with a scanty supply of water.

THE GASTRIC JUICE

secreted in the fourth stomach is similar to that in other animals. Gastric juice does not vary, being essentially the same in the shark and man. The action of this juice, being confined to nitrogenous substances, would at first appear of slight consequence in herbivorous animals, but the proportion will be seen by reference to the table below. Ruminants, with the exception of the camel, secrete proportionately more gastric juice than solipeds. A cow secretes about 50 quarts in twenty-four hours, and a horse about 40 quarts.

Ruminants secrete less *bile* than many other herbivorous animals, although much more than carnivora. According to one statement, the amount secreted in one hour is: Horse, 250 to 300 grammes (8-10 oz.); ox, 100 to 120; sheep, 18 to 20. M. Colin gives the amount secreted in twenty-four hours as follows in kilogrammes: Horse, 6; ox, 2.64; sheep, .34. In the bile of ruminants (and all herbivorous animals) the glycocholate of soda is the principal salt, although there is always

some of the taurocholate (the salt of the bile of carnivora) present. The color being green in herbivorous animals instead of red, as in the carnivora, is due to the excess of carbon in the blood, which leads to the formation of bile verdin (green pigment) rather than bile rubin.

The *pancreatic juice* of herbivorous animals is weaker than that of carnivora, but its function of emulsifying fats is equally important, for while ordinary meat contains but 15 per cent. of fat, the proportion in vegetable substances will be seen in the table below.

AN ANALYSIS OF THE FÆCES'

of animals, when the amount and nature of the food taken is known, shows the amount of the different substances retained in the body, and in this way the following facts have been discovered:

In herbivorous animals the percentage of the food absorbed is less than in carnivorous or omnivorous animals. The percentage digested on an ordinary diet is: Herbivora, 60 per cent.: pig, 80 per cent.; man, on flesh diet, 95 per cent.; on fruit diet, 87 per cent.; carbo-hydrates, 99 per cent.

An ox fed upon twenty pounds of clover hay per day was found to digest the following percentage of its constituents: Proteid, 50; fat, 45; carbo-hydrates, 70; cellulose, 40.

One fed on the same amount of meadow hay was found to digest the following percentage: Proteid, 60; fats, 40; carbo-hydrates, 65; cellulose, 60.

Of concentrated foods, such as corn, the greatest amount is absorbed.

The digestion of cellulose and coarse fodder (hay, etc.) is more active in ruminants than in the horse, and as cellulose forms 25 per cent. of hay and nearly 50 per cent. of straw, this is an important fact. From 40 to 60 per cent. of it is digested. Outside of the body it has been found that the only things which affect cellulose are strong acids and alkalis. Boiling with strong acids will turn it into sugar, and experiments by MM. Popoff and Hoppe Seyler have shown that in its decomposition it gives rise to a large amount of carbon-dioxyde and carburetted hydrogen; and as the latter is found in considerable quantities in the large intestines of herbivorous animals, it is inferred that cellulose digestion takes place in the cœcum of the horse, and principally in the colon of ruminants, although some is digested in the paunch.

The digestion of coarse fodder is decreased as more concentrated food is mixed with it.

PERCENTAGE OF FAT, NITROGENOUS COMPOUNDS AND CELLULOSE IN VARIOUS FOODS.

	Fat.	Nitrogenous Matter.	Cellulose.	The balance other Carbo-hydrates.
Hay	3	7 to 12	25	
Wheat straw	3	3	35 to 50	
Pea and bean straw	—	7 to 10	—	
Tree leaves	—	20	—	
Turnips	2	15	7	
Cabbage	3	30	9	
Potatoes	1	9	9	
Cauliflower	—	64	—	
Wheat bran	4	16	—	
Corn	9	12	6	
Oats	7	14 to 20	2.5	
Wheat	1.5	10 to 20	5	
Barley	2	12 to 15	3	
Beans, peas, lentils	2	24 to 30	10	
Very young peas	—	48	—	
Acorns	3	15	2	
Rye	3.5	12	3	
Buckwheat	0.4	10	25	
Linseed	25	20	8	

ART. XVII.—PRACTICAL SUGGESTIONS TO YOUNG VETERINARIANS: ABSTRACTS OF AN ADDRESS DELIVERED BEFORE THE GRADUATING CLASS OF COLUMBIA VETERINARY COLLEGE.

BY EZRA M. HUNT, M.D.
Secretary New Jersey State Board of Health.

Permit me, gentlemen, in closing, to say a few words to you, as students or graduates, as to how you shall best carry on this your work, and give to your profession the certification and success which it needs and which is its due.

That young man will be a success in the veterinary profession who to-night feels that he has but little more than acquired a knowledge of scope and of methods, and who resolves that he will *now* become a thorough student, and with the guide he has received *proceed* to study this science and this art for at least ten years of his life, as if he were in a part of his preparatory course. It is not worth the while of any man who is not satisfied only just to have been trained into methods, and who is not willing to be a close student for many years to come, to attempt this department. The scope with any one animal is almost equal to that which the human physician attempts on his own chosen being. I have almost felt that it would be wise to attempt the study and treatment of but one animal at a time, until at least four or five of the more important ones are taken in their turn.

It is mostly *foundation work* that you are after in such an institution as this. It is a discovery of defects, a training in methods, a habit of thoroughness, thoroughness as far as you go, that you need to seek and to secure here. Oh! the narrowness of the student who carries away with him his budget of facts and prescriptions and imagines that he has a store. Oh! the breadth of the man who just feels he has found out how to study, how to acquire, how to amass, how to dispense abroad, and beholds the boundlessness of possibilities and probabilities before him if only he is diligent, fervent, and faithful.

I know a man who built a house on a too narrow foundation. The mason concealed his four inches of blunder, and so in a

year or two he had to arch, prop and patch all through the basement. That narrow foundation ought to have been seen to then and there. It is just as poor policy for you to go on accumulating superstructure and piling up knowledge unless the groundwork is right. Not only is knowledge power, but to know how to acquire knowledge is more power. Half knowledge of methods is not only, as a rule, powerless for good, but is that little learning which is a dangerous thing. The man who is ever busy to store his memory in his college course, instead of still more devoting himself to being trained in methods, is sure to be superficial and to be full of piece-meal ideas. This may make you to seem narrow in the start, and not to be a man of *general* information, but it makes you specific, and that assures increase and endurance into the end.

The habit of minute observation and introspection, and of a knowledge of details, while needed for every professional man, is especially to be commended to you. General knowledge always passes for more than it is worth in any department in which educated practitioners or experts are scarce. This easily leads to superficiality even on the part of some graduated practitioners, since general information is worth very little to practice by. Be, therefore, very close observers, even if afterward you have to study out the significance of your observation. Men even when admiring animals in general, are *not* close observers of particulars as to them. I think I may illustrate by five or six questions in your line of study, which perhaps it is not presumptious to say that all of you could not answer.

Are a cow's ears before or behind a line with the roots of the horns, and, if so, what is the usual angle? How many teeth are calves, colts, and lambs born with? What animals have eyelashes and eyebrows? Why do not cows sit down to rest the same as dogs? Why does a cow get up on her hind feet, and a horse on the front feet? Why does a sheep kick with its front feet, while mules have a well sustained notoriety for kicking with all their hinder parts, backward, upward, and onward? Accurate knowledge of the habits and functions of animals is the more needed by you, because there are many things that, if done well, must be done by yourselves instead of being, as they would be by human doctors, committed to nurses and attendants. If your medicine is to be effective in a case of active inflammation, often you must give it yourself to know that it is rightly administered without waste. The bandaging cannot be left to others. The use of the

thermometer, as I have seen it used by veterinarians, is, in the hands of three-fourths of them, of little or no diagnostic value. Yet, if used with all the minuteness of knowledge and method desirable, and tested sufficiently often, it is of great service. Close observing and accurate executing of what your knowledge and observation convinces you of is indispensable, if perfection in your art is to be acquired and the science advanced.

The stable and the cow-pen may not seem to invite to refinements of tastes. The ostler and the herdsman may not, as a rule, belong to select company; yet be assured there is such a thing as treating every man in his position with respect and of acting so as to secure his appreciation and patronage, and yet not accept the common level of those with whom he mingles.

If your mouths are to be befouled by the uncourtly oath, if the bar and the treat are the necessary concomitants of your vocation, if soiled clothing and unkempt person are to be accepted as in accord with your duties, then, I beseech you, cry out for the flesh-pots of Egypt to-night. I know of no class of men who more need to practice cleanliness of person, speech and behavior. I wish I could have each one of you take a few object lessons in neat practice from two distinguished veterinarians I have met. They know how to pick up a horse's foot secundum artem, how to move about a stable, not daintily, but properly, how to slip on and off the needed covering, how to cleanse the hands and instruments, how to be properly familiar with groom and herdsman and jockey, and yet have professional individuality of their own—in a word, how to carry their profession with them with no arrogance, with no undue reserve, and yet so that the calling is appreciated through the person. I could point you to many others I have met whose skill I know and whose attainments I have fathomed through their unkempt surroundings, who in their actual daily practice belittle their calling by their disregard of water and their careless toleration of dirt.

This whole subject of sanitary police should impress itself upon all veterinarians. Its details are matters for definite instruction as to methods.

I have met so many gentlemen in this calling, and yet have seen such contrasts of carelessness and thriftlessness, that I know you will not mistake my appreciation when I thus speak of mode and manners, or what the ancient ethics called minor morals,

and commend all the details of sanitary order and cleanliness as to yourselves, your instruments, your entire equipment, armamentaries, to your personal consideration and adoption.

To you who are about to go forth to the duties and the requirements of your professional life, I am glad to-night to be able to extend the greeting hand of a sister art, and to assure you that the medical profession bids you a hearty welcome within the precincts of its high court.

In the last year we have joined hands as never before. The name of Chauveau, Touissant and Pasteur have dwelt together like brothers in unity in our hearts and upon our lips. With no flourish of trumpets, but with triumphs second only to those of Jenner, and even greater in the "boundless anticipations" which it entertains, we find our pliant fingers together at work in a common laboratory.

Etiology, Physiology, Pathology, Surgery and Practice bends the knee and turn a listening ear to the voices which are coming from the animal world. The listening, the watching, the waiting, is for the interest of all living creatures. All death, all pain, all discomfort, has very much at stake. The value of foods, the conveyance of diseases, the thrift of great industries, and great matters of social and political economy are involved. The time has come when expert knowledge must be had. In the great minglings of the nations, pestilences no longer stay in their birth-places. The isolation of a sail voyage no longer secures immunity. Rinderpest, or foot and mouth disease, or the violent forms of anthrax, may arrive in cargo in the next steamer, and be a peril to the life of man and beast over a whole continent. Appeals to humanity, to self-interest, and to self-preservation are such as cannot go unheeded. I have reason to know that, at this very time, the Government of the nation and some of the States are looking for competency in these directions. Mediocrity is seeking after more knowledge, and superiority is already in full demand. Students, exact observers, clinicians, and skilled practitioners, are wanted. Professional life, your life, if true and successful, will be arduous. These are not days of sinecure in this or the medical profession. The plod and ardor of work, of discovery, of accurate seeing and close analysis, must be yours. With its toil it has its gracious satisfactions.

The advance cannot be rapid, but it will be sure. The half century for work which opens to-night before you, opens as no half century

of science has opened since the world began. Applied art is the handmaid of the science you seek, and there is a full market for its skilled products. With character as your capital, with industry as your basis of exchange, with definite outlines of your pursuit, with training in methods of acquisition, and with God's blessing upon you in a ministry of good to the creatures which he has made, you go forth bearing precious seed. Between the sowing and the reaping there be many seasons; for the plants are not animals. But keep heart, go forward, be faithful. There will be a fruitage. Science is your wand, and the skill of an effective art your sickle. Like good shepherds, be diligent to know the state of the flocks, and look well to the herds. Besides the pleasure of knowledge and the joy of one's chosen art, I doubt not the lambs will be for your clothing and the cattle for your meat, and ye shall have enough for your food; for the food of your households and for the maintenance of your maidens.

ART. XVIII.—PURULENT ARTHRITIS: ONE OF A COURSE OF LECTURES DELIVERED AT THE COLUMBIA VETERINARY COLLEGE, N. Y. CITY, IN 1881–82.

BY WILLIAM HENRY PORTER, M.D., D.V.S.,
Professor of Surgical Pathology and General Surgery.

This is a special form of disease, differing somewhat from the suppurative arthritis of rheumatism, or the suppurative arthritis of white swelling. In this special form we have an abundant formation of pus, the rapidity of which is out of all proportion to the other inflammatory symptoms. This form of arthritis is met with in connection with purulent infectious diseases, viz., puerperal fever, small-pox, glanders, etc

Pathological changes: The synovial membranes and fringes are congested, and changes in the cartilages can often be detected by the unaided eye. The prominent lesion, however, is the rapid formation

of a large quantity of pus. The production of pus in this disease cannot be accounted for by a simple proliferation of endothelial cells. Here the Cohnheim's theory helps to explain the rapid development of pus, namely, a rapid migration and multiplication of the blood corpuscles. But with this it is hard to comprehend, especially where several joints become affected simultaneously.

Occasionally cases are met with in which the whole cartilage has been destroyed. In such cases the cartilages evidently melt down, and help to form the pus. This form of arthritis is rare, but may be seen in connection with cases of glanders. Suppurating joints of pyæmia come under this heading. Such a condition is occasionally seen in the newly born and still less frequently in the utero.

Causes.—Necrosis of the ends of long bones, caries, tubercular masses, as grapes of horned cattle, injuries, punctured wounds, and all the poisonous diseases already named which tend to cause suppurative inflammation. A simple acute arthritis, if prolonged, will of necessity, if not speedily cured, become chronic and assume a purulent character.

Symptoms: are pain, heat, swelling, and a peculiar position of the joint.

The *pain* is often severe, tense and burning; the movements of the building or the slightest jar increases the suffering, and any attempt at physical examination is followed by like results. The pain is universally greater at night.

The *heat* of the joint is considerably above that of the normal. There is often superficial redness.

The *swelling* in these cases is uniform, involving the whole articulation, and not projecting at single points, as in simple synovitis.

As a rule, the swelling is not elastic, but soft and doughy, and not fluctuating. The lack of positive fluctuation may be accounted for by the involvement of the surrounding tissues, which are also very much swollen and œdematous. As the disease advances, the swelling often increases suddenly and to a considerable extent, which increase may be the result of one of two things. First, there may be an increased irritation of the synovial membrane, which causes the production and accumulation suddenly of a large quantity of pus in the joint cavity. Second, the production of pus may be so great in quantity that the synovial sac gives way from over-distention, and the pus is diffused into the surrounding cellular and muscular tissues, causing a diffuse

suppurative cellulitis, thus causing an enormous and alarming swelling.

The *position* of the limb assumes that of renuflexion and eversion. In animals the tendency will be to rest only the toe on the ground.

Spasms or *twitching pains* of the limb often develop just as the patient is on the point of dropping to sleep, and this condition alone may deprive the patient of a night's sleep or several in succession.

The *constitutional* symptoms in a severe case are a high fever, pulse quick and irregular, a partial sweating of the whole body, with marked sweating of the affected limb. If the disease continues to advance and suppuration is fully developed in the joint, there is an increased heat in the joint accompanied by throbbing pain, and finally fluctuation may be detected. Occasionally in man the accumulation of pus is so rapid that laxation of the joint has occurred, but in equine surgery this would probably never be the result. Loosening and stretching of the ligaments occur, allowing the bones to grate against each other, when the articular cartilage has been destroyed and the ends of the bones laid bare. In other cases no grating is met with, sufficient cartilage being left at points to prevent the bared bones from coming together, or the surface of the denuded bone may be covered with a paste-like material which prevents the signs of grating. Cases are met with where there is every evidence of extensive erosion of the cartilages and yet no suppuration occurs. All the symptoms subside and recovery follows with but slight anchylosis. A nearly reverse condition is also true. Extensive suppuration occurs, but there is no laxation of the joint, no grating of the bones, but recovery is slow, and complete anchylosis the final result. In some of the cases where the capsule gives way, the pus escapes and is diffused widely throughout the tissues, or it gets between the periosteum and the bone great swelling and œdema of the limb will follow and we have incomplete fluctuation over a large territory. In such a case the swelling of the joint may completely subside and lead one to suppose that the trouble is past, but if the tissues are compressed above, the joint will speedily refill. In these cases the pus often makes its exit at some distance from the joint involved, a hectic condition often develops, and death instead of recovery is the result. The only condition which this form of joint affection could be mistaken for, would be an abscess forming close to and over a joint.

Joint Affection.	*Abscess.*
Severe constitutional symptoms.	Less severe.
Great general swelling all around joint.	Less general swelling, marked at localized point.
Deep fluctuation.	Superficial fluctuation.
Rigidity of joint.	Absence of rigidity.
Preternatural mobility.	Mobility nearly normal.
Pain greater.	Pain less.
Spasms and startlings.	None.
Sometimes luxation.	No luxation.
Grating of the bones.	Never.

The *treatment* is very easy to describe, but, like many things in equine surgery, exceedingly hard to put in practice fully and faithfully. The leading and principal thing is to secure perfect rest. Here again the plaster-of-Paris or Tripolith splint with extension ought to be used. The only possible way in which this can be accomplished is by raising the animal from the ground, in slings with extension, by a weight attached to the foot. When in this position, the apparatus should be applied, and when thoroughly set the limb will be immovable. The object in extension is to separate the articular surface and to secure perfect rest to the inflamed joint. Success in accomplishing these two things will give the best possible results in this, as in all other forms of joint affections. Warm fomentations, anæsthetic liniments, blisters, firing, etc., are recommended. Firing and blisters act more by increasing the pain and compelling the animal to keep the joint quiet than in any other way, and is a cruel method of treatment.

The shoe may be removed or a high-heeled one put on. The latter will give the animal the greater relief, but in case of recovery with anchylosis the limb will be practically worthless.

Mild cathartics should be used, and opium given to relieve the pain, guarding carefully against the constipation which is so apt to follow the constant use of opium.

EDITORIAL DEPARTMEMT.

PROTECTING ANIMALS BY VACCINATION.

PASTEUR'S method of vaccinating against splenic fever or anthrax was described in our last issue. Since that time it has been tried quite extensively not only in France under Pasteur's direction, but in Hungary and in Prussia.

In the latter country the results were as follows: Fifty sheep and twelve cows were taken, and divided into two equal lots. The first lot of twenty-five sheep and six cows were vaccinated with the cultivated virus of anthrax prepared by Pasteur. Two weeks later they were vaccinated again. For Pasteur has found that a double or "secondary" vaccination is necessary to make the protection more sure. Three sheep died after the second vaccination.

Three weeks later all the forty seven sheep and twelve cows were inoculated with virulent anthrax blood. Of the protected animals, none died. Of the non-protected, three cows and all the sheep died.

This can be best shown by a table:

Animals experimented on: 12 cows, 50 sheep.		Inocuulated with anthrax blood.	Death resulted in
Vaccinated twice: 6 cows, 25 sheep.	Died from 2d vaccination: 3 sheep.	6 cows.	0
		22 sheep.	0
Unvaccinated: 6 cows,		6 cows.	3 cows.
25 sheep.		25 sheep.	25 sheep.

In Hungary, similar results were obtained. The conclusions are that the protective vaccination has a value; but when a farmer has his herds thus treated, he must expect to *lose ten per cent.* by the measure. In some countries anthrax destroys sixty per cent. of the herds. Hence vaccination is the better of the two evils there.

A PARASITE THE CAUSE OF BOVINE TUBERCULOSIS.—Dr. Robert Koch, a German physician, has discovered a minute organism in the lungs of consumptive animals. He considers it to be the veritable cause of tuberculosis in all its forms in man as well as in beast. The organism in question is rod-shaped, and about one six-thousandth of an inch long. It is found in tuberculous matter everywhere, even in tuberculous sputa. Dr. Koch cultivated it in ox-serum, then inoculated animals with the cultures. In this way he claims that he has produced a true tuberculosis. The discoverer of the new organism thinks that bovine and human tuberculosis are identical; also that tuberculosis can be given to man by the milk, and perhaps flesh, of tuberculous cows. Dr. Koch's conclusions have a very important bearing on veterinary sanitary science, if they are true. This is far from being proven as yet.

THE EFFECT OF VARIOUS MEDICINES UPON THE MILK SECRETION.—This subject, which should be of much interest to veterinarians, has been recently studied by Dr. Max Stumpf, of Munich (*Archivs für Klinische Medicine*).

He comes to the following conclusions:

I. As regards changes in the quantity of milk.

1. Iodide of potassium lessens the amount.
2. Alcohol, morphine and lead do not affect it.
3. Saticylic acid lessens it slightly.
4. Pilocarpin does not promote milk secretion.

II. Changes in quality.

1. Iodide of potassium causes a diminution in all the ingredients of the milk.
2. Alcohol increases the relative amount of fat.
3. Salicylic acid increases the amount of sugar.
4. Lead, morphine and pilocarpin do not affect the quality.

III. Regarding the passage of medicine into the milk.

1. The iodine of iodide of potassium goes rapidly into the milk, and disappears very soon when medication is stopped. In vegetable feeders the iodine is eliminated in the milk slowly.
2. Alcohol in herbivora does not pass into the milk.
3. Lead goes into the milk in very slight traces.
4. Salicylic acid passes into milk in slight amount.

How Much Does the Horse's Hoof Expand?—Drs. A. Lungwitz and H. Schaaf have made some very exact experiments in order to answer the above question. They constructed a shoe on purpose for the measurements, and used it in many experiments. Their results can best be shown in the following table. The widening was measured in millimetres (one millimetre equalling about 1-25 inch).

Kind of Gait.	No. of Experiments.	Fore Hoof.		Total Widening.	No. of Experiments	Hind Hoof.		Total Widening.
		Outside Widening.	Inside Widening.			Outside Widening.	Inside Widening.	
At rest.	24	.25	.27	.57	8	.25	.40	.65
Walk.	25	.60	.75	1.37	8	.45	.56	.96
Trot.	55	.92	1.51	2.48	14	.40	.76	1.25
Gallop	8	1.21	2.00	3.28	4	.75	1.81	2 56

These figures show not only the exact amount of lateral expansion, but also that the expansion is rather more upon the inner side. They furnish definite data upon which those interested in the physiology and pathology of shoeing can work.

A New Cause for Bloody Urine in Horses.—Professor J. Lange, of Kasan, reports (*Zeitschrift f. Thiermedicin*) a very interesting case of hæmaturia in a horse, due to the presence of a parasite, probably the *filaria* of human blood. The animal was taken ill quite suddenly, refused to eat, became constipated, weak, and finally jaundiced. The pulse was feeble, temperature 39.7° C. The urine was dark-colored from blood pigment, but few red blood corpuscles being discoverable. Albumen was also present. On examining the blood from different parts of the body, under a microscope, a thread-like parasite, 1-800th inch long by 1-1850 wide, transparent and cylindrical, was seen in great numbers. A little channel seemed to run through its body. The horse, in a few days, improved, though the urine remained bloody. In about a month, it suddenly cleared up.

Professor Lange believes that the parasite is identical with that found in man, causing chyluria. He thinks also that the filaria may be a more frequent cause of hæmaturia in horses than is supposed. The filaria sanguinis hominis has been before found in the horse, and the suggestion of Professor Lange is worth the careful attention of veterinarians.

Digestion in Ruminant Animals.—We would call the attention of our readers to the full and careful description of digestion in ruminants given in this and the preceding number of the Journal. A very large number of the diseases of cattle are connected with the digestive organs. A full knowledge of the subject is of the highest importance to the veterinarian therefore.

We may supplement Mr. Slee's description with some recent observations made by Professor Ellenberger upon the *Nervous Supply of the Stomachs of Ruminants.* He states, as the result of his experiments:

1. That the pneumogastric is the motor nerve for the stomachs of all ruminants.

2. The stomachs have, however, local ganglia, by means of which movements are possible even after both pneumogastrics are cut.

3. The second stomach, or recticulum, contracts voluntarily and quickly, like striped muscle. Its muscular coat, however, is made up of smooth muscle fibres. The paunch has also only smooth muscle, yet its movements are much more energetic and rapid than is ordinarily observed with such muscle.

4. The psalter, or third stomach, moves and functions quite independently of the three other stomachs. It has a special nerve supply, consisting of ganglia in its walls, with nerves running to the different leaves.

5. The psalter is excited to motion by local irritation. The course of excito-motor fibres from the nerve-centres is not known.

The Identity of Bovine and Human Tuberculolis has been tested again with inconclusive results by Professor Pütz, of the Veterinary College of Halle. He experimented upon five animals, injecting into their tissues tuberculous fluids obtained from men. On February 6th, he injected half an ounce of tuberculous matter from a human lung beneath the skin of a bull-calf. A week later he made a similar injection directly into the lung tissue. The animal was killed six months later and its tissues found to be perfectly healthy.

A horse had injected under the skin of the chest, ʒ ½i of pus from a tuberculous abscess. Three weeks later ʒ ss. more was injected in two places. A pig was injected once with the same matter. Two weeks after the last injection the animals were killed and found to be slightly tuberculous.

A ten months old calf was inoculated with no result. A colt had tuberculous matter injected directly into his lungs. The result was the rapid development of an acute tuberculosis.

The experiments throw some doubt over the exact identity of human and bovine tuberculosis, or at least over the absolute infectiousness of the former.

MONSTROSITIES IN GENERAL: A DOUBLE-FACED HORSE.—A very rare deformity, classed technically as *tetrascelus bifacialis conjunctus*, is described by Dr. Th. Bauer (*Zeitschrift f. Thiermedicin*) as occurring in a foal. The mother was seven years old, and the birth was normal.

The top of the skull was double, there were four eyes, two ears, one lower jaw, slightly twisted outwards, one set of cervical vertebræ. At the first dorsal vertebræ the backbone split so that two spines were formed. There was therefore a double chest, with two sets of ribs. The animal had two pelves united together, but only four feet and only one anus. There were two tongues and two throats, but only one larnyx and two nasal openings. Only one gullet and trachea were present.

There have been only ten such cases as the above reported in domestic animals, viz., six in sheep, two in pigs, one in a cat, and one in a horse. Also two in fowls.

The cause of such monstrosities is thought to be in a crossing or partial fusing of two primitive traces. Dr. E. P. Murdock, in a recent lecture on this subject, makes some comments which may be appropriately quoted here: "I have often observed," he says, "that peculiar kinds of deformities are peculiar to certain orders of the animal kingdom, such as supernumerary prongs on the echinodermata, cleft caudal appendages in the fish, extra limbs or double feet in birds, acephalous monsters in sheep, cyclops in swine, and double monsters in man. It is also true that monstrosities are much more frequent in domestic animals than in the wild state. This is also true of plants spoiled by cultivation. They are more frequent in mixed races than in isolated tribes, and more frequent in the female than in the male sex. Even in birds they are more frequent in the pure family classes.

Paralysis in Cows and Hæmoglobinuria in Horses from the Same Cause.—Some interesting cases have been reported by Mayer (*Repertorium Thierheilkunde*) showing that the same cause can act in curiously different ways upon different animals. They also illustrate the necessity of veterinary hygiene.

Within six weeks four horses and six cows, kept in the same stable, were attacked—the first with hæmoglobinuria (bloody urine), the others with paralysis of the pharynx.

The history is as follows: Three horses were first attacked with bloody urine; two of them died within twenty-four hours. Then two cows became afflicted with paralysis of the pharynx. These, not being able to swallow, were, after two or three days, killed. Ten days later the remaining four cows were attacked in the same way and had to be killed. The stalls were cleaned, and two more horses placed in them. In three days they were attacked with bloody urine.

The cause was proved not to be in the food. It was concluded that it must have been in the very bad hygienic condition of the stalls. These were low, damp, badly lighted, and undrained.

CASE DEPARTMENT.

1.—GANGRENA ORIS IN A PYTHON—A NEW FORM OF BOTHROCEPHALUS.

In May last a large python died in the Central Park menagerie, after suffering some time from the ulcerated sore mouth common to serpents. At the post-mortem examination one patch on the left side of the lower jaw, just below the margin of the alveola, was gangrenous and fully the size of an old-fashioned shilling piece. In the intestinal canal were found about a dozen tape-worms, all of one variety and of various ages and sizes. The anterior segment was peculiar in being bifid, while the blunted extremeties of each head was armed with a single sucker but no hooks. The segments were imperfectly separated from one another, as in all of this special variety of tape-worms. A fine sample has been sent to Mr. Cobbold, of London. The books contain no description of a tape-worm provided with such a peculiar but characteristic head.

CENTRAL PARK, NEW YORK CITY.

II.—INTUSSUSCEPTION OF THE ILIUM IN A TWO-YEAR-OLD STALLION.

REPORTED BY GEORGE M. PARKINSON, D.V.S.

Previous History: About one year ago the colt passed two or three worms which resembled angle worms in shape and length, but lighter in color (probably lumbricoid). April 8th, first saw animal. During the previous two or three days the groom noticed the animal turning his head and looking at the right flank, would lie down and roll, then get up, start off and run, but this did not cause any alarm. The colt had been kept on low damp pasture land

Examination: Found the animal thin in flesh, pulse feeble and scarcely perceptible, soft and compressible; number of pulsations per minute, sixty; respirations about normal; temperature 104.5° F.; appeared to be in constant pain, walking around in a circle with extended head and pointing towards the floor.

At short intervals he would lie down on the floor, roll on his back and extend all four limbs, and remain in this position for about one minute; would then get up, look anxiously at right flank, and then sit down upon haunches. These movements were frequently repeated. All the visible mucous membranes were slightly injected. There was slight tympanitis over the right iliac region. There was no attempt to evacuate the bowels. There was profuse sweating, and he soon became pulseless and died after an illness of only twenty-seven hours.

During this time I emptied the bladder by means of a catheter; gave opium in two-ounce doses, and chloral hydrate in one-ounce doses; used enemata of soap-suds medicated with gum-assofœtida, also the following bolus:

℞

Aloes Barb., ℥ vi.
Zingib. Rad. Pulv., ℥ i.
Nuces Vomic. Pulv., gr. xxx.
Nx. et first in bolus, No. i.

Sig. at once.

Necropsy: Twenty-four hours after death great quantities of long round worms in the stomach and bowels, also patches of congestion. The colon was markedly inflamed. The last foot of the ilium had slipped through the ileo-coreal valve and become invaginated, and was in a gangrenous state. What fœcal matter there was in the colon was dry and hard, stomach and small intestines filled with fluid.

MIDDLETOWN, CONN.

[The worms in this case, we are inclined to think, were the Strongylus Gigas.—ED.]

III.—SUPPURATIVE NEPHRITIS IN A YOUNG DROMEDARY.

In December last a young dromedary arrived at this port from Hamburg, having been very much exposed to the unusually stormy weather of that month. During a voyage of twenty-three days the decks of the steamer were almost constantly washed by the heavy seas, and as the animal was part of the deck load, he was wet a good deal of the time. On his arrival great weakness was manifested, in fact, he could hardly stand. No other symptoms were noticed. On the second day after arrival at the Central Park menagerie he died. At post mortem examination hypostatic œdema of the lungs was found, and, in conjunction, suppurative nephritis, the kidneys being the seat of abscesses, and their substances gangrenous. This acute attack was presumed to have been induced by the constant exposure on deck during the ocean voyage.

CENTRAL PARK, NEW YORK CITY.

IV.—ACUTE LEAD POISONING IN A COW.

REPORTED BY GEORGE M. PARKINSON, D.V.S.

Cow, æt. nine or ten; native stock. When first called to see the case, found a roll of lead in the stall, and inferred that she had been licking it, and possibly swallowed some of it, as it was moist and freshly fractured.

When first seen was in good flesh, and previous to this had always had a good appetite and apparently had been perfectly well.

Symptoms.—Severe pain, groaning, lying down, getting up, with some distention of the left lumbar region. The head hung down, and the nose was frequently pressed against the manger. Breathing sterterous, stomach full and hard. Rectum empty. Visible mucous membranes, pale in color.

Diagnosis.—Mild form of lead colic.

Treatment.—Ordered:

℞

Magnesia Sulphatis,	℥ xvi.
Zinc Rad. Pulv.,	℥ i.
Nux Vom., Fld. Ext.,	Nx. xxx.
Mx. Aquæ,	℈iv.

Sig. at once.

I also gave her several enemas, and to quiet pain, chloral hydrate in ounce doses.

About three hours later her bowels commenced to move quite freely. She drank a pail of gruel, and the pain was apparently gone.

The next day, or April 13th, her temperature was 103.2° F.; pulse, sixty and irregular; respirations not disturbed. The stomach, however, remained hard, but she was up and chewing her cud. The cathartic given the night before was still acting. Appetite poor. I ordered the following:

℞

Acid Sulphuric, dulci,	℥ i.
Ext. Gentiane, Fld.,	℥ iv.
Glycerine,	℥ iij.

Mx. sig.; ℥ ij. in one pint of water, night and morning.

In the evening, called again and found her sufficiently improved to be discharged as convalescent.

MIDDLETOWN, CONN., April, 1882.

V.—ACUTE GASTRO-ENTORITIS FROM AN OVERDOSE OF SODIUM CHLORIDE.

REPORTED BY GEO. M. PARKINSON, D.V.S.

June 4th.—Was called to Middlefield, Ct., to see a cow, aet 7 or 8. Found animal dead.

Previous History.—The cow was taken sick in the night, and died in the morning. The evening previous she ate over a quart of rock salt which had been used to make shad brine. The salt, however, had been thoroughly washed. She was in fair flesh.

Symptoms.—Bloated rapidly, and gave every evidence of suffering considerable pain; would lie down, then get up, but soon got down and was unable to get up.

I saw her about an hour after she died. She was then lying on her side, and the abdomen was enormously distended with gas.

Diagnosis—Gastro-entoritis due to an over indulgence in sodium chloride.

All that was done in the way of treatment was by the owner, who administered some oil.

Necropsy.—Two hours after death. There was not the strong sulphuretted hydrogen odor in this case as is common in most cases. *Bladder* distended and contained four or five quarts of urine; but the organ itself appeared to be perfectly normal. *Uterus*, empty. *Rectum*, protruding and congested. Intestines distended by gas, abomasus and small intestines gave evidence of marked inflammation, and at points were black as if gangrene was about to occur. Mesenteric glands slightly enlarged. Small amount of fluid in the peritoneal cavity.

All the stomachs contained a small quantity of ingesta.

MIDDLETOWN, CONN., May, 1882.

VI.—TUBERCULOSIS IN A COW.

REPORTED BY THOMAS A. ALLEN, M.D.

In the Spring of 1880 I was called to see a common bred cow that had been troubled with a cough and gradual emaciation for a year. When I arrived, she was lying on her right side, breathing very rapidly. The emaciation and weakness had reached such a degree that she was unable even to raise her head from the ground.

Convinced that there was no chance of recovery, I severed the jugulars and allowed her to bleed to death. She bled freely, and the blood was very dark in color.

Necropsy immediately after death.—Right lung a complete mass of tuberculous matter or nodules. The left lung was in nearly the same condition,

excepting one portion, about the size of a man's head, which remained normal.

The *diaphragm* was thickened by these tuberculous nodules, and measured eighteen centimetres in thickness. The *costal* pleuræ were thickly studded with the same kind of nodules. The *peritoneum*, both visceral and parietal layers, were thickly studded with tubercular masses, varying in size from a millet seed to a large cucumber.

The whole mass of new development would weigh about thirty pounds.

BROCKVILLE, ONT., CANADA, April 28th, 1882.

VII.—A CASE OF COLIC FOLLOWED BY ENTERITIS ULCERATION OF STOMACH AND POSSIBLE PERFORATION.

REPORTED BY DRS. WALTON AND M'LELLAN

A horse, about twelve years old, was brought to the hospital showing symptoms of colic. The usual remedies were administered, with negative results. Further inquiry into the previous history elicited the fact that the horse had been fed apples at the last feeding. Further examination revealed acidity of the stomach and eructations of fœtid gases. Sodi bicarbonates and cathartics were administered. The pain soon became continuous, which was partially removed by hypodermic injections of morphine. At the end of fourteen hours the severer symptoms had nearly disappeared, he appeared weak and refused food.

An attempt was again made to move the bowels. Oleum lini was freely administered, and later magnesia sulphatis, but without the desired result.

The animal continued in this condition for about four days. At the end of this time min. x. of oleum tiglii in oleum lini was tried. This opened the bowels, and free movements followed. The horse now commenced to eat a little soft food, but continued dull in spirits for two days after.

On the morning of the seventh day from the onset of the attack he developed marked symptoms of violent pain, and died in less than two hours.

Necropsy shortly after death. The only marked lesions were a pronounced congestion of the whole alimentary canal, deep and extensive ulceration of the mucous membrane of the stomach.

COLUMBIA VETERINARY COLLEGE HOSPITAL, NEW YORK CITY, 1882

[The cause of death in this case seems a little doubtful, but we think it can be explained by the extreme prostration of the nervous system, or one of the ulcers in the stomach may have perforated the peritoneal cavity allowing the escape of gases and not of solid matter, which in itself would be a sufficient cause of death.—ED.]

VIII.—IMPACTION OF THE COLON IN A HORSE.

REPORTED BY DRS. WALTON AND M'LELLAN.

In April, 1882, a horse was brought to the hospital with the history that he had been comparatively idle for three months. At the end of this time he was put to steady work on a cart. After two days of hard work his appetite failed, and there was no discharge of fæcal matter.

The owner, however, continued to work the animal a day longer, having administered a dose of oleum lini the night previous. When brought to the hospital there had been no evacuation from the bowels for the previous seven days, nor had he taken any food worthy of note.

The animal was evidently suffering considerable pain. A diagnosis of impaction of the colon was made, and an unfavorable prognosis advanced. Oleum lini, with oleum tiglii, was given. The animal, however, died on the eighth day of the disease.

Necropsy the following morning. At one point the colon was completely filled with hardened fæcal matter, which was forty-one centimetres long. Just anterior to the occlusion the colon had given way, which was the probable cause of the sudden death.

COLUMBIA VETERINARY COLLEGE HOSPITAL, NEW YORK CITY, 1882.

IX.—FLATULENT COLIC IN A HORSE.

REPORTED BY DRS. WALTON AND M'LELLAN.

A horse suffering from flatulent colic was brought to the hospital for treatment.

All the ordinary materia medica remedies failing, surgical interference was resorted to. The cereal end of the colon was punctured with a trocar, which gave the animal instant relief.

After the operation, the animal was placed upon a light and fluid diet and kept perfectly quiet for several days.

After five days, he was put to light work.

Ten days after the operation pus commenced to exude from the opening. When the side was examined, it was found that a pocket of pus had developed and burrowed downward ten centimetres

A counter opening was made at the dependent portion, and a seton introduced. At the end of a week, the wound was perfectly healed.

COLUMBIA VETERINARY COLLEGE HOSPITAL, NEW YORK CITY, 1882.

X.—LACERATED WOUND OF THE NECK IN A HORSE.

REPORTED BY DRS. WALTON AND M'LELLAN.

A horse was brought to the hospital bleeding profusely from a punctured and lacerated wound located at the junction of the middle and posterior third of the neck.

The animal was one of a pair that had run away and broke the pole of the wagon, one of the sharpened ends of the broken pole causing the wound.

The direction of the wound was upward and forwards, and it was found when examined to contain several slivers from the broken pole. These fragments of wood were imbedded in the adjacent muscle.

Treatment.—All foreign bodies were carefully removed, such arteries as could be reached ligated; but plugging and a compress were the principal means by which the hæmorrhage was arrested.

The following day the bandages were removed, and a drainage tube inserted.

In a few days there was a very free discharge of pus.

About the third day considerable fever was noticed, but it readily yielded to treatment.

At the end of the second week the drainage tube was removed, and four weeks later the animal was so near to complete recovery that he was discharged.

COLUMBIA VETERINARY COLLEGE HOSPITAL, NEW YORK CITY, 1882.

XI.—A NOVEL WAY OF FEEDING PUPS.

REPORTED BY GEORGE M. PARKINSON, D.V.S.

My red Irish setter bitch has six pups, aged nine weeks, which she has weaned. She goes with me to my boarding place, takes her rations, and returns to her pups, vomits and lets the pups eat. The first time the act was performed, I supposed she was sick, but she constantly repeated the act.

One evening I took her to tea with me. She ate her supper, and I remained a little longer than usual, when she commenced to cry and whimper, as she always does when she wants anything or to go anywhere.

I could not imagine what was wanted, but soon found out when I got back to where her puppies were, for she had discharged the contents of her stomach, and the puppies were enjoying their supper. This may not be uncommon, but I have never witnessed it before or seen any one who has.

MIDDLETOWN, CONN., May, 1882.

REVIEWS.

THE SIMPLE AILMENTS OF HORSES: THEIR NATURE AND TREATMENT. By W. F. Landon. Paris and New York: Cassell, Petter, Galpin & Co. 1882.

Veterinarians and owners of horses will find some interest and no little profit in this small octavo of about 200 pages. The style is simple and attractive, while there is no attempt at any scientific treatment of the subject. Instead of any classification of the different diseases of the animal, the author arranges them alphabetically, with a descriptiom of each disease under the name, and also proper remedies to be used. We would call attention particularly to an interesting chapter on "How to Move a Sick Horse."

BOOKS AND PAMPHLETS RECEIVED.

JAHRESBERICHT DER K. CENTRAL-THIERARZNEI SCHULE IN MUNCHEN. 1880-1881. Leipzig, 1882.

A CONTRIBUTION TO THE SUBJECT OF NERVE-STRETCHING. By William J. Morton, M.D. New York. 8vo. pp. 31. Reprint from the *Journal of Nervous and Mental Diseases*, Vol. IX., No. 1. January, 1882.

CATALOGUE COLUMBIA VETERINARY COLLEGE AND SCHOOL OF COMPARATIVE MEDICINE. 1882.

THE VETERINARY JOURNAL. London.

DER ZOOLOGISCHE GARTEN. Zeitschrift für Beobachtung Pflege und Zucht der Thier Gemeinsames Organ für Deutschland und angrenzende Gebieté. Herausgegeben von der "Neuen Zoologischen Gesellschaft" in Frankfurt a M.

WOCHENSCHRIFT FUR THIERHEILKUNDE UND VIEHZUCHT. Augsburg.

SCHWEIZERISCHES ARCHIV FUR THIERHEILKUNDE UND THIERZUCHT. Bern.

REPERTORIUM DER THIERHEILKUNDE. Stuttgart.

DEUTSCHE ZEITSCHRIFT FUR THIERMEDICINE. Leipzig.

ZEITSCHRIFT FUR VERGLEICHENDE. Leipzig.

ARCHIV FUR WISSENCHAFTLICH UND PRACTISCH THIERHEILKUNDE. Berlin.

LA PRESSE MEDICALE. Paris.

THE CHICAGO MEDICAL JOURNAL AND EXAMINER. Chicago.

THE MEDICAL RECORD. New York.

THE COLLEGE AND CLINICAL RECORD. Philadelphia.

ANNALS OF ANATOMY AND SURGERY. Brooklyn.

NEW ENGLAND MEDICAL MONTHLY. Newton, Conn.

CHICAGO MEDICAL REVIEW. Chicago.
ST. LOUIS CLINICAL RECORD. St. Louis.
JOURNAL OF NERVOUS AND MENTAL DISEASES. New York.
THE ROCKY MOUNTAIN MEDICAL TIMES. Denver.
WALSH'S RETROSPECT. Washington.
VIRGINIA MEDICAL MONTHLY. Richmond.
THE WESTERN MEDICAL REPORTER. Chicago.
THE SOUTHERN CLINIC. Richmond.
NASHVILLE JOURNAL OF MEDICINE AND SURGERY. Nashville.
THE BLACKSMITH AND WHEELWRIGHT. New York.
NATIONAL LIVE STOCK JOURNAL. Chicago.
THE BREEDERS' GAZETTE. Chicago.
THE CULTIVATOR AND COUNTRY GENTLEMAN. Albany.
INDIANA FARMER. Indianapolis.
MIRROR AND FARMER. Manchester, N. H.
TRUTH. Published weekly. San Francisco.
THE WEEKLY DROVERS' JOURNAL. Chicago.

PROGRESS OF VETERINARY SCIENCE.

TYPHOID FEVER IN A HORSE.—A case which was diagnosed as typhoid fever in a horse is reported by Dr. Ubele, of Künzelsan. The symptoms were severe fever, 103° to 107°; pulse, 60 to 110; suffused eyes; no appetite. On the ninth day, death occurred. Post mortem showed extensive exchymoses of the mucous membranes, and intense congestion about Peyer's patches.

AN OSSIFYING SPINAL PACHYMENINGITIS IN A DOG.—A four-year-old dog suffered for two weeks, apparently from an influenza. It grew weaker daily. Posterior paralysis and, finally, complete paralysis of the legs developed. The animal then died. Post mortem showed wide-spread catarrhs and broncho-pneumonia. On opening the spinal cord, evidences of a diffuse myelitis were found, while in the thickened dura mater were numerous bony plates one to one and a-half inches long.

HAIR-BALLS IN A TEN-DAYS-OLD CALF.—Dr. B. Th. Leitner reports (*Zeitschrift f. Thiermedicin*) the case of a ten-days-old calf in whose œsophagus was found a hair-ball the size of an apple. It was probably formed during intra-uterine life by the calf swallowing the fluid in which it floated.

DILATED AND CALCIFIED ARTERIES IN A PARROT SIXTY-FOUR YEARS OLD.—At the post mortem held over the remains of a pet parrot (*Zeitschrift f. Thiermedicin*) it was seen that all the large arteries leading from the heart were lined with a whitish layer, and looked as though they had been injected with gypsum. This calcification was found to extend even to the small arteries of the legs, wings, and mesentery. The left ventricle of the heart was hypertrophied, the right dilated and thin.

The other organs showed that the animal had died from chronic inanition, due to deficient blood supply from the calcified arteries. There was a general venous conjestion with bleeding into stomach and intestines, and finally death from carbonic acid poisoning and heart failure.

DEATH FROM ASPHYXIA IN A SWAN.—Professor Bonnet describes the post mortem upon a swan which had died suddenly after feeding. The larynx was found completely filled with a piece of cheese. The swan did not consequently sing before he died.

GALL STONE IN A HORSE.—Dr. Cl. Marggraff reports a case of a horse which suffered for some time from jaundice. On post-mortem, a brownish-yellow gall-stone was found impacted in the bile duct. The liver showed evidence of congestion and interstitial inflammation, and was stained with pigments.

IN ANSWER to numerous inquiries regarding the health of Dr. C. D. House, we are glad to state that he is now convalescent, and is staying for the Summer in Connecticut.

SYRINGE FOR VETERINARY USE.—Drs. Findeisen and Vogel, German veterinarians, have extensively used an injection syringe made on the principle of the Davidson syringe, but much larger. Vogel has found it of great value in uterine catarrhs, fluor albus, sterility, retained placenta, as also in colic and constipation.

KIDNEY DISEASE IN THE COW is, according to Leimer (*Repertorium der Thierheilkunde*) most frequently of the form known as *interstitial nephritis.* A parenchymatous change is often associated with this.

BILE PIGMENTS IN THE URINE OF THE DOG. — Dr. Eugen Fröhner (*Deutches Zeitschrift fur Thiermedicin*) asserts that, normally, there are none of the bile-coloring matters in the dog's urine. When these are found it indicates either (1) a gastro-intestinal catarrh or (2) a lowering of blood pressure in the internal organs, especially the liver. This latter may be produced by injuries and bleedings of external organs.

EXPERIMENTS WITH HUCH'S KRAFT-FUTTER OR BLOOD-MEAL ON HORSES. —This special food for horses contains a large amount of albuminous substances (36 per cent.), considerable fat (1.2 per cent.), phosphates and other salts. It has been tried upon army horses by Dr. Findeisen of Ulm. The regular daily ration for each horse was: oats, 10½ lbs.; hay, 5 lbs.; straw, 7 lbs. To this was added 1½ of the "blood-meal." The horses eat it with great avidity. The four horses experimented upon gained an average of 20 lbs. in a month, and improved very much in general condition.

EPIDEMIC NOSE-BLEEDING AND PERNICIOUS ANÆMIA IN DOGS. — M. Meguin reports that in the disease called epidemic bleeding of the nose of dogs, there is a chronic inflammation of the mucous membrane of the small intestine and cœcum, in which the membrane and villosities are thickened and reddened. These lesions alone would explain the anæmia, but they are produced by the bites of numerous worms (*ankylostonum* and *tricho-cephalus.*) The same condition has been found to exist in cats.

REMEDY FOR LICE.—Lice on cattle may be easily and thoroughly destroyed by a tar ointment. Melt together an ounce of tar and a pound of lard, and stir while cooling. Apply a little on the parts most affected. It may even be applied lightly over the whole skin without danger to the animal. The same good results may be obtained from boiling an ounce of tobacco in a quart of water and sponging the parts with the solution.—*National Live Stock Journal.*

GOITRE IN THE LOWER ANIMALS.—Goitre is not an affection peculiar to man alone. M. Adam, veterinary surgeon at Augsburg, has remarked that after staying a certain length of time in that city a number of horses were attacked with goitre. There are only a certain number of stables where goitre shows itself, all situated at the east of the city. It is impossible to determine the cause of it. Goitre is not rare with the dogs of Augsburg, and is unusually frequent with the inhabitants of that city. The disease does not prevail in Switzerland, however.—*Medical Record.*

DIPHTHERIA IN CALVES COMMUNICATED TO PIGS.—Mr. Cole, a veteritarry surgeon of Hinckley, in Australia, has published the following illusnation of the way in which diphtheria may be communicated from one of the domestic animals to another of a different species, thus indicating special sources from which the human disease may at times be contracted. A calf, about five months old, was found to be dying with some symptoms of a throat disorder, and instructions were given to have the body buried, which through some neglect was not done immediately, so that a sow which managed to get access to the enclosure, attacked the diseased meat and ate some of it. This circumstance came to be known when, a few days later, some of the pigs were taken down with throat disease. Eventually the sow and her young pigs were also victims. These latter died within twenty-four hours, while the others, including a boar, recovered entirely. Apropos of this outbreak among domestic animals an account is given of an epidemic that occurred in the Oakleigh police station, the disease being on this occasion traced to a diseased cow, whose milk had been used by the inmates of the station.—*Australian Veterinary Journal.*

EFFECT OF ARSENIC ON CATS.—Chronic poisoning by arsenic has received the experimental attention of Drs. Caillot de Poncy and Livon, and the results of their observations may be of value to certain ladies and not a few medical practitioners. Small doses were given to cats at intervals. Under the influence of arsenic they were able to take more than the normal quantity of food. For a time they increased in weight, and presented every outward evidence of good health. By and by a change occurred. The cats had diarrhœa; they lost appetite; they became languid, and they died in an anæmic and lean condition.

HUMAN AND BOVINE TUBERCULOSIS.—In the *Italia Medica*, the paper read by Dr. Bizzozzero on the above subject, at the International Medical Congress, held at Turin, is published, and in it are held the following conclusions: Human and bovine tuberculosis have between them the closest anatomical affinity. When the matters of both are inoculated in susceptible animals, they equally give rise to the development of tubercular neoformations—a result which is not produced by inoculation with other substances. It must, therefore, be admitted that their virus is identical; and this shows the necessity for resorting to severe prophylactic measures in order to prevent the transmission of the disease from animals to man.—*National Live Stock Journal.*

RESUSCITATION OF ANIMALS AFTER EXPOSURE TO EXTREME COLD.—F.F. Loptschinski says (*Vratsch*, No. 5–7) there is a remarkable disagreement between experimenters and clinical observers as to the manner of treating individuals that have been exposed to extreme cold. While nearly all of the latter hold that the application of heat should be gradual, the former (Beck, Horwat, Jacoby) advise that it should be rapid. The author has experimented with dogs to solve this question. Some of the animals were exposed to cold air (—17° C., two above zero F.); others were packed in freezing mixtures (—13—15° C., 5—8° F.). After freezing, one of the animals (twenty experiments were made, each with three dogs) was immediately placed in a warm bath of 37° R. (115° F.); the second was placed in a room the temperature of which was 22—24° R. (81—86° F.); the third was placed in a temperature of 0° (32° F.), and then as the temperature of the rectum arose and manifestations of life were shown, the bodily temperature increased. Friction with brushes and dry cloths were used in all three

cases. The experiments, which were made with great care, throw light on the various conditions, which will not be referred to here (blood examinations, microscopic examinations of the muscular tissue, conditions of temperature, etc.); but there were other results which have a practical significance for physicians. Of twenty animals that were exposed to a low temperature, which was gradually elevated, fourteen died; of twenty animals that were immediately brought into a warmer department, eight died; of twenty animals that were immediately placed in a warm bath, *none* died.

NEWS AND MISCELLANY.

Professor David, Director of the Veterinary School at Bern, died recently.

Royal College of Veterinary Surgeons.—At the annual meeting, Mr. George Fleming, F.R.C.V.S., was re-elected President of the Council for the third time, and Prof. A. Smith, Dean of Toronto Veterinary College, was made an honorary member.

Edinburgh Veterinary College.—The appointment of Professor of Physiology in the Dick Veterinary College having become vacant through the translation of Dr. Cunningham to Dublin, the Town Council of Edinburgh on Tuesday elected Dr. James (recently appointed Assistant Physician to the Royal Infirmary) to the Chair of Physiology in the College. The other candidate, Mr. Johnson Symington, M.B., had previously withdrawn his application, so that there was no contest.

Royal Agricultural Society.—The annual meeting of the members took place at the office, Hanover Square. The report submitted showed that the society had a total of 8,080 members, being an increase of 101 since the last annual meeting. The funded property of the society has been increased by the investment of £3,000, and now stood at £18,428 new Three Per Cents. The Duke of Richmond and Gordon was elected president for the ensuing year; twenty-five retiring members of the Council were elected, and Lord Evelyn was elected in the place of the Earl of Leicester.

Cæsarian Section in a Cow.—Dr. William A. Jackman sends us the following account of the operation: The cow belonged to Mr. J——, and was unable to give birth to the calf, which afterwards proved to be a very large one. The cow died, and a few minutes after Mr. J. discovered the calf was alive, and it occurred to him that the calf might be saved. The operation was performed with a pocket knife, the calf saved, and is now doing well; I have seen it myself. The most singular point in this case is that it should have been done by a *farmer* with a pocket knife, who perhaps had never heard of such a thing before, at least says he never did in the human race.

Decrease of Sheep in England.—It is stated that, at the present time, the stock of sheep in England is considerably smaller—some estimates put it at 2,000,000—than it has been for many years past, and the primary cause is said to be the liver rot, which caused serious losses in sheep in the midland counties during the wet season last year. It is believed that it will be two or three years before the great loss is made good; but, no doubt, the present lambing season, which is most encouraging, will have a tendency to improve the present state of affairs. Farmers give very encouraging reports with respect to their lamb crop, many of them stating that their ewes are dropping couplets and triplets.—*Drover's Journal.*

CONSUMPTION OF HORSE FLESH.—An official report just published shows that, since the time when horse flesh was first retailed in Paris as an article of human food, the consumption of that delicacy has steadily increased. In 1875 the number of horses slaughtered for this purpose was 7,000, and this had risen to 9,000 in 1880, and again to 9,300 in 1881. Besides these there were sold at the forty establishments, exclusively devoted to carrying on this business, ten carcases of donkeys in the first mentioned year, 320 in the second, and 400 in the third. The estimated weight of horse flesh consumed in Paris last year was about 1,670 English tons, in addition to about eighteen tons of donkey flesh, without reckoning the offal, which is used in the making of sausages.—*Drover's Journal.*

A LECTURE ON HORSES was delivered at Trinity College, Dublin, recently, by the Rev. J. P. Mahaffy, Professor of Ancient History in the University of Dublin. The reverend gentleman said that all the facts were in favor of the development of the horse, the rhinoceros, and the tapir from a common parent. It was doubtful whether there now existed in the world a real specimen of the original wild horse. Many people thought that what were now apparently wild horses in Upper Asia were only the descendants of tame horses that had been let loose. There was reason to believe that there yet roamed, in the high and cold plains of inner Asia, two or three kinds of horses that had never been tamed. The domestic horse now in use was liable to panics. This had been supposed to be due to improper treatment and feeding; but observers of the horse which ran wild in America had seen that when herds of them smelt water they rushed to it with such violence that they killed each other. The first stage of domestication of the horse was the nomadic, in which the animal was only used for food.—*Drover's Journal.*

HORSE-CLEANING MACHINE.—A novel machine has been exhibited at New York for cleaning horses. The "Lightning Horse-Cleaning Machine" is almost similar in appearance to a trapeze, and about the size of the trapeze rope. At the end of either arm is a hair brush of superior bristles. Steam power was used, and in action it is simply an "automaton man," reaching from the nostril to under the fetlock joint of the horse, over and to every part of the body. In rapidity, it works fifty times faster than a man, and in its motion this wonderful "universal joint" turns about the brush in every possible direction, describing the complete radius of a sphere of 360 degrees. The machine was seen in full operation by a correspondent, and horses were passing rapidly to it and through the grooming process. Some horses were cleaned in from one and a half to two minutes. The skin was found to be perfectly clean, and one application also highly improved the appearance of the coat.

ANIMALS THAT DRINK RUM.—It is to be hoped that all the temperance people have read of Jumbo's whiskey drinking during the trip from England, for it is quite time that the old theory that animals will not touch liquor should be swept away. But Jumbo is not the only four-footed beast that indulges in strong drink. Thousands of race-horses have taken a pint of whiskey or brandy before running, oxen have been dosed with rum before going into great dragging matches, hogs learn more easily to drink than boys do, tame bears will guzzle beer like so many capacious Germans, chickens will swallow rum-soaked corn as long as their "crops" will stretch, and bulldogs will cry—or whine—for any alcoholic liquor of which they

have ever felt the effects. If, instead of talking twaddle about liquor, the temperance people would explain that the great risk in the use of any stimulant is that those who once have felt its exhilarating effects are sure to long for them again, and that all animal life, high and low, vulgar and refined, is alike in this respect, they would do more good and be less laughed at.

Ways in Which Milk May be Affected.—A summary of the different ways in which milk may become so affective as to transmit disease to human beings has been presented by Dr. Vacher: 1. The milk may be derived from a tuberculous cow. 2. It may be derived from a cow suffering from a specific epizootic disease. 3. It may be drawn from an inflamed udder. 4. It may have undergone chemical or fermentative change. 5. It may have become infected with the contagium of an animal disease. 6. It may have become infected with the contagium of a human disease. Two preventives of mischief are recommended to the consumer: 1. To examine the milk delivered to him and to reject it if it appears to be watered, or if it is streaky, ropy, blood-stained, or smells bad from any cause. 2. To insist upon all the milk received being thoroughly boiled. To these precautions may be added that of keeping the milk in covered vessels in closets where the atmosphere is clean and cool. Milk or butter, unless carefully preserved from contamination, will very soon play havoc with a sensitive constitution. The restaurant system of exposing butter to an atmosphere charged with all manner of abominations is highly reprehensible.

That Dogs Appreciate Medical Treatment is a fact that has been often attested. A story has lately been published illustrating this. One afternoon a little black-and-tan dog was found moaning piteously at the entrance of a hospital in East Concord street, Boston. The animal's apparent suffering attracted the attention of Dr. C. E. Hastings, one of the faculty, who made an examination, which revealed a bad compound fracture of the leg. The doctor set the bone, and gave the little sufferer such other treatment as the case required.

The Cemetery for Cats.—The burial-place for pet animals, dogs, cats, and little birds is emerging from the region of dreams. The prospectus of the Zoölogical Necropolis Association (limited), which lies before us, with its imposing array of patrons, directors, bankers, brokers, solicitors, and secretaries, shows that the scheme is being pushed in the orthodox commercial fashion, and any one who wishes to subscribe can purchase as many of the five thousand two-pound shares as his inclination leads him and his finances permit. The burial-ground is to be established "within a few miles of London," and, "if wished for, a tribute to their memory can be erected by those who love them." In due time we shall have a cats' undertaker setting up in business, but for the present it is sufficient to say that the offices of the Cats' Cemetery Company are at No. 27 Henrietta street, Cavendish Square, W., where all necessary information can be obtained by intending shareholders.

Bird's-Nest in a Horse's Tail.—Interesting cases have been from time to time recorded of extraordinary places selected by birds for habitation and nesting; and I take this opportunity of bringing to your notice a case which occurred w en I was in camp at Fort Napoleon, Conference Hill, Zululand, and which appears to me to be unique.

A gray gelding cob, bought about the end of June, 1879, at Wakkers-

troom, from Mr. Fawcus, a government surveyor, whilst I was on special duty purchasing remount horses for the Cavalry Brigade, was noticed at the time of purchase to have a peculiar knotted condition of the tail. After arriving at its destination at Fort Napoleon, several days' march distant, it was placed on the flank of the troop of King's Dragoon Guards, to which it was told off. The next morning, after reveille, the non-commissioned officer in charge of the troop noticed a little dark-colored bird (known, I am told by our interpreter, as a weaver or bottletit) fly and conceal itself in the cob's tail just at the extremity of the dock. Shortly afterwards he saw it reappear, settle near some spilt forage in the picket lines, feed, and then return to its former hiding-place. This roused the curiosity of the non-com., who, accompanied by several of the men of his troop, examined the cob's tail, and there found a perfectly-formed bird's-nest, about three inches in diameter, and about six inches from top to base, beautifully lined with short chestnut-red hair, which, upon examination, I found to have been collected from the red transport oxen, and not from chestnut horses. The most striking thing which occurs to me is that the little bird must have accompanied the cob from Wakkerstroom, in the Transvaal, to our camp in Zululand, sufficient time not having elapsed since its arrival at the fort for so complete a nest to have been manufactured.

When I bought remount horses, I always immediately cut their tails short, so that I could easily distinguish them, when grazing during the day, from other horses belonging to civilians and others; and when squaring this cob's tail with the scissors I remarked to Capt. Becher, who was with me, that the tail was peculiarly matted and curled, and therefore very difficult to cut quickly. The cob was driven, with a string of others, by Zulus from Wakkerstroom to our camp, about five days' journey.

As a twig of any sort, to say nothing of a tree, is quite a rare thing to see in many parts of the Transvaal and Zululand, and as the nights are particularly cold, I can quite understand these tame little birds getting into the hair of a horse's tail for warmth when the animal was lying down, and, later on, taking it into their heads to make a nest in such comfortable quarters.

S. Longhurst, A.V.D., K.D. Guards (Meerut, Bengal).

—*The Field.*

To Keep Flies from Horses.—The *Indiana Farmer* advises its readers to procure a bunch of smartweed and bruise it to cause the juice to exude. Rub the animal thoroughly with the bunch of the bruised weed, especially on the legs, neck and ears. Neither flies or other insects will trouble him for twenty-four hours. The process should be repeated every day. A very convenient way of using it is to make a strong infusion by boiling the weed a few minutes in water. When cold it can be conveniently applied with a sponge or bush. Smartweed is found growing in every section of the country, usually in wet ground near highways.

The (Veterinary) Anatomist to His Dulcinea.—

I list as thy heart and ascending aorta
Their volumes of valvular harmony pour,
And my soul from that muscular music has caught a
New life 'mid its dry anatomical lore.

Oh! rare is the sound when thy ventricles throb
In a systolic symphony measured and slow;
When the auricles answer with rythmical sob,
As they murmur a melody wondrously low!

Oh! thy cornæ, love, has the radiant light
  Of the sparkle that laughs in the icicle's sheen,
And thy crystalline lens, like a diamond bright,
  Through the quivering frame of thy iris is seen.

And thy retina, spreading its lustre of pearl,
  Like the far-away nebula distantly gleams
From a vault of black cellular mirrors that hurl
  From their hexagon angles the silvery beams.

Ah! the flash of those orbs is enslaving me still,
  As they roll 'neath the palpebræ, dimly translucent,
Obeying in silence the magical will
  Of the oculo-motor, pathetic, abducent.

Oh! sweet is thy voice as it sighingly swells
  From the daintily-quivering chordæ vocales,
Or rings in clear tones through the echoing cells
  Of the antrum, the ethmoid and sinus frontales.

Turkish Baths for Horses.—Dr. Isaac Hough, surgeon-in-charge of the Third Avenue Railroad stables, in which there are 2,000 or more horses, has been successfully treating the disabled ones by a system of Turkish and Russian baths. A space about as large as six or eight ordinary stalls has been tightly inclosed in a corner of the building, with thick board walls, floor and ceiling. The floor is covered with movable slats, and under these slats are steam pipes, by which the temperature can be run up to 100, 150 or 200 degrees, at the will of the operator. In another apartment are rows of gas-burners, for horses requiring treatment with hot air. In front of two of the stalls are small, square windows, each large enough for a horse to put his head through. These windows can be closed with board shutters, and they are also provided with heavy curtains, opening in the centre. When it is desirable to give a horse a very hot bath in a room whose temperature must be higher than the horse could breathe with comfort, one of the windows is opened, and the horse, with his body in the bath, puts his head out into the cool air. The curtains are then drawn tightly about his neck to prevent the heat from escaping, and the horse has all the luxury of a Turkish bath without the inconvenience of breathing the overheated air. Horses requiring treatment are left in the hot bath from twenty minutes to an hour, and are then washed with tepid water and thoroughly scrubbed. A horse, on coming out of the bath, is taken into the cooling-room and kept there an hour or more, the temperature being lowered gradually till it is the same as in the body of the stable When this point is reached the horse is ready to be taken back to his stall, and is, to all intents, a new animal. If the first bath does not remove his complaint, he is given another and another on successive days till he is cured. The stablemen say that the horses have learned the pleasures of the Turkish bath, and evidently like the process. One horse, a very nice-looking gray, with a sore hind-leg, has taken four baths, and is said to walk up to the door of the bath-house whenever he is at liberty and wait to be let in. For strains, sprains, and various other ailments, electric baths are given. The horse to be treated with electricity is put in the warm room, and is well rubbed down with sponges attached to electric wires. The animals do not quite know what to make of the electric shock, but they are said to take kindly to it after they have had a little experience. In the Russian baths, where the steam is let out of the pipes into the room, till the atmosphere is wet enough to bottle, the horses sometimes rebel, but never make any very vigorous resistance. Several have been treated that were

too sick to stand up in the bath. For the accommodation of such unfortunate invalids there is a stout blanket, fastened to ropes running through pulleys in the ceiling. The blanket is put under the horse's body, and, when the ropes are tightened, the horse enjoys the luxury of the bath swinging in a hammock. In every material point the baths are precisely similar to those provided for men and women. The horses are heated to a high point, deluged with cold water, thoroughly kneaded, slowly cooled off, and well rubbed down. The electric bath is a very powerful one, the batteries being capable of giving a shock that would make any human bather squirm.

Dr. Hough is enthusiastic in describing the results of his system of horse-baths. He tells of one of the best mares in the stables that two weeks ago had a very severe case of pneumonia. Her pulse was extremely high, and she had a dangerous rattling in the bronchial tubes. He put her in the new Russian bath and kept her in nearly all the afternoon, reducing the temperature gradually. She perspired very freely, and, when she was taken out of the bath, the rattling was entirely gone. The next day the mare was much better, and the bath was repeated. On the third day she was given another bath, and when she came out her pulse, respiration, and temperature were normal. At the end of a week she was entirely well and was put to work. For pink-eye, the baths are very efficacious. A horse was put in the hot-air bath with his eyes entirely closed and a heavy discharge of white mucus from eyes and nostrils. On the day following the first bath the swelling was greatly reduced and the discharge had disappeared. Two horses have been treated for founder; both successfully.

Cruelty to a Horse Punished.—Two dissected fetlock joints of a horse's feet were produced and offered in evidence in Special Sessions yesterday, before Justices Gardner, Morgan, and Smith, who were called upon to hear an extreme case of cruelty to animals. Officer Smart and Superintendent Hartfield, of the Society for the Prevention of Cruelty to Animals, arraigned at the bar John D. S. O'Brien and Henry Reising, both of Jamaica. Officer Smart swore that he arrested O'Brien on Sunday, December 18th, at Third Avenue and Twenty-second Street, while he was driving a team attached to a loaded hay-truck. One of the horses was suffering from shocking sores on both his fore feet, and walked on the back edges of his hoofs only. Both feet were swollen and bleeding, and it was evident that the animal could not have proceeded on its way but for the fact that the other horse partly dragged it along. The driver, Reising, who is also a stable-boy, told the officer that the horse had been harnessed that day at Rockaway Beach, and had been driven thence to this city. He was instructed to drive it by the prisoner, O'Brien, who owned it. The horse was subsequently subjected to examination by four veterinary surgeons, who found its feet in the last stages of suppuration and disease. The poor brute was then killed, and a post-mortem examination of the feet made for the purpose of securing proper evidence of the extreme and inhuman brutality of O'Brien in causing the horse to be worked at all. O'Brien's counsel did not attempt to deny the cruel treatment, but strove to have the case dismissed, on the ground that, as the horse had been harnessed in Rockaway, the case belonged to the jurisdiction of Queens County. The motion was denied and O'Brien was fined $150, the stable-boy, Reising, being fined $10.

Duck-Rearing in China.—Some years ago, Mr. George Brooke, the well-known poultry salesman of Leadenhall Market, showed me a letter from a gentleman detailing a system of duck-rearing which

he had seen practiced in China. The method adopted was as follows: The ducks are hatched out by hot sand and divided into lots of a hundred to a hundred and fifty. A wicker fence is made to inclose a stream and its banks, the area of land and water inclosed being about twenty feet square; in this the young ducklings are placed. Mat sheds are made on the banks to shelter the ducklings from the heat of the sun or under which they may rest at night. They go to and from the stream or banks at their own will. A small boy takes charge of about five of these lots. When the ground gets foul, in the course of four or five days, the fence is moved much in the same way as hurdles are moved for sheep on turnips, three of the sides being shifted to inclose a fresh area adjoining. Large streams are made to branch off into several small ones, for the purpose of getting clean water to as many of the inclosures as possible. When very young, food is given them frequently during the day. It consists of boiled rice mixed with sweet potatoes, etc., and given them in the form of "dry dough." To prevent waste and to keep the soil clean, the food is strewn on mats. After the meal is over, the mats are washed and hung up to dry, which of course they do very quickly in a hot climate. There is very little food wasted, for the attendant knows almost exactly how much will suffice each lot for one meal. As the ducks grow, two lots of a hundred and fifty are put together, and a larger inclosure made; as they still further increase in size, two lots of three hundred are put together, and so on. Each time the inclosure is enlarged, the labor of one boy is dispensed with. The large lots require no more attention than the smaller ones, as the time of feeding is less frequent as the ducklings grow older. "When grown sufficiently strong, they are herded in flocks of some thousands by a man carrying a long bamboo rod, and he moves them from rice-field to rice-field, where they guddle amongst the mud, and are fed for almost nothing." They are brought home at night to sheds, which are floored with dry earth frequently changed and used as manure. The ducks when killed are, in most cases, "salted, smoked, and hawked about the streets of the large towns."

Toothsome Python Eggs.—When a German professor is engaged in what he believes to be scientific investigation his boldness knows no limits. Dr. Hermes, the learned Director of the Berlin Aquarium, did a deed in the interests of science only a few days ago that entitles him to rank among the most intrepid heroes of modern times. A "happy event" had recently come off in the reptile department of the Aquarium. No fewer than fifty-six eggs had been laid by one of the female pythons herein abiding. Dr. Hermes, on learning the joyful news, at once resolved to test the availability of serpentine ova for human consumption as an article of food. To this end he invited a select party of local gourmands to lunch, and commenced his experiments by boiling a python's egg for several minutes and offering it—opened in the usual manner—to his guests, who, however, respectfully declined to taste it, upon the ground that cooking had produced no visible alteration in the consistence of its external and internal substances—respectively a greenish leathery skin and an opaque, yolkless, gray liquid. Not particularly fancying the look of this egg himself, Dr. Hermes proceeded to open another, and emptied its contents into a frying-pan. Adding butter and salt in due proportions, he soon succeeded, with the aid of a gas stove, in producing a python omelet, which is reported to have "smelled uncommonly appetizing." Finally, none of his friends showing any ambition to

vie with him for the honor of the first taste, he valiantly swallowed a mouthful, and pronounced it "supremely toothsome." Fired by his example all present then partook of the savory mess with apparent relish. Every one must admire Dr. Hermes's courage; but few probably will be disposed to emulate it. Pythons' eggs may be paramount delicacies. For the present, however, most people will persist in deriving the staple of their omelets from the farm-yard, in preference to the reptile house of the Zoo.

The British National Veterinary Congress.—Part I. of the "Proceedings of the British National Veterinary Congress," held in the rooms of the Society of Arts, in July last, has recently been published; and Part II, which is to contain the reports of committees and of colonial sections, will shortly follow in the form of an appendix. The project of assembling the members of the veterinary profession for the discussion of urgent and important professional topics originated with a few veterinarians attending the sittings of the British Medical Association held at Cambridge during August, 1880. The course of the discussion at the Public Health Section showed that much information in the possession of the veterinary profession required to be made generally public; and encouragement was derived from the fact that on the Continent, in various countries, gatherings of veterinarians had been recently tried on a large scale, and with marked success. Again, the profession in the United Kingdom had lately become consolidated by the admission of the Highland and Agricultural Society's graduates to the membership of the Royal College of Veterinary Surgeons; and, lastly, the proceedings at several meetings of veterinary societies had rendered it evident that some opportunity should be given of ventilating subjects of more than local professional importance, and on which the votes of a large number of members of the profession from different parts of the kingdom should be taken. The sittings of the Congress lasted two days, and the proceedings appear to have been satisfactory to the large number of member who attended it.

Influence of Race upon the Action of Poison.—The researches of M. Chauveau (*Jour. Therapeut.*) upon the relative immunity of Algerian sheep from malignant pustule, give support to this question. M. Bordier finds that the edible frog (Rana Esculenta) and the ordinary frog (Rana Temporaria) act very differently under the same quantity of *caffein;* whilst the tree frog (Rana Viridis) is less sensitive to the action of *veratrin* than the two preceding forms. In Tarentin, according to Darwin, the inhabitants only breed black sheep because the hypericum crispum, which abounds there, kills off all the white sheep within fifteen days. In Virginia the *lachnanthes tinctoria* destroys the white fowls, whilst black ones eat it with impunity. Cl. Bernard showed that different races of dogs and horses possessed distinctive physiological characteristics which were proportional to differences in the properties of certain histological elements, more especially in the nervous system. Negroes can take enormous doses of *tartar emetic*, and according to Dr. Thaly, they can ingest one gramme in the course of twenty-four hours with no more effect than would be produced by five cgr. in a white man. They also bear *mercury* well Broca also noticed that decomposition sets in more slowly in the bodies of persons belonging to this race. The negro can similarly carry a large quantity of *alcohol* without being overpowered by it; and in the black, white and yellow races an equal quantity of *alcohol* will not produce a similar state of intoxication. The yellow race can take large doses of drastic medicines.

THE SALMON DISEASE.—Professor Huxley has a long paper in *Nature* describing the results of his recent researches into the disease which has during recent years played such havoc among the salmon in British rivers. He has made a thorough examination of the minute structure of both the healthy and diseased skin; and has tried some experiments on the transplantation of the *Saprolegnia* of the living salmon to dead animal bodies. In the latter case, the body of a recently killed common house-fly was gently rubbed two or three times over the surface of a patch of the diseased skin of a salmon, and was then placed in a vessel of water, on the surface of which it floated, in consequence of the large quantity of air which a fly's body contains. In the course of forty-eight hours, or thereabouts, innumerable white cottony filaments made their appearance, set close side by side, and radiated from the body of the fly in all directions. As these filaments had approximately the same length, the fly's body thus became inclosed in a thick white spheroidal shroud, having a diameter of as much as half an inch. As the filaments are specifically heavier than water, they gradually overcome the buoyancy of the air contained in the tracheæ of the fly, and the whole mass sinks to the bottom of the vessel. The following Professor Huxley gives as the chief results of this season's observations on the salmon disease. Incomplete as they are, they appear to justify the following conclusions: 1. That the *Saprolegnia* attacks the healthy living salmon exactly in the same way as it attacks the dead insect, and that it is the sole cause of the disease, whatever circumstances may, in a secondary manner, assist its operations. 2. That death may result without any other organ than the skin being attacked, and that, under these circumstances, it is the consequence partly of the exhaustion of nervous energy by the incessant irritation of the felted mycelium with its charge of fine sand, and partly of the drain of nutriment appropriated by the fungus. 3. That the penetration of the hyphæ of the *Saprolegnia* into the derma renders it at least possible that the disease may break out in a fresh-run salmon without reinfection. 4. That the cause of the disease, the *Saprolegnia*, may flourish in any fresh water, in the absence of salmon, as a saprophyte upon dead insects and other animals. 5. That the chances of infection for a healthy fish entering a river are prodigiously increased by the existence of diseased fish in that river, inasmuch as the bulk of *Saprolegnia* on a few diseased fish vastly exceeds that which would exist without them. 6. That, as in the case of the potato disease, the careful extirpation of every diseased individual is the treatment theoretically indicated; though in practice it may not be worth while to adopt the treatment.

A HERMAPHRODITE HOG.—The Nashville *Journal of Medicine and Surgery* reports a case of, as it claims, genuine hermaphroditism in a hog. The specimen was brought to the notice of the Secretary of the Savannah State Board of Health, and was carefully examined by Dr. J. E. Dobson. It consisted of a uterus having attached at one end an ovary, and at the other a well-developed testicle. Or rather the uterus, which in a hog is bifid, had only one end, while the other was an undeveloped scrotum. The testicle was perfect in all its appointments, having a spermatic cord and the usual folds attached. The outward appearance of the hog was that of a female, though the clitoris was evidently an imperfect penis, and the doctor had frequently noticed emissions of semen. Unfortunately for the cause of science the doctor failed to preserve all the attachments. It would have been peculiarly interesting to have noted the attachments of the spermatic

cord, and it would have been well to have preserved all the genital organs. This is much to be regretted, as the clear case of a hermaphrodite is almost unknown. This is the best authenticated case we know of. It is evidently a commingling of the sexes in one being, as the uterus is only half developed, and there was but one ovary and one testicle. The hog had the habits of a male more than that of a female, though it was both one and the other. The specimen, in alcohol, was presented by Dr. Clark to the museum of the University of Nashville and Vanderbilt University.

Live Stock in the United States.—The census bulletin just issued giving the statistics of animals on farms in the United States, June 1st, 1880, shows that the increase of the stock since 1870 has been much greater than that of population, but a good deal less than the advance in the yield of corn. While the growth of population was 30 per cent. and of corn production 131, the rate of increase of horses was 45 per cent., milch cows 39, cattle 66, sheep 24, and swine 90. The increase of sheep is apparently less than that of population, but in reality it is believed to be greater, owing to the fact that the census returns of 1870 include a large number of spring lambs which are wholly excluded from the statistics of 1880. The leading wool-growing States are California with four and Ohio with five million sheep. But it is noteworthy that while the number has increased fifty per cent. in the former State it has decreased one per cent. in the latter. In Texas, Colorado, Nevada, and several of the Territories, there has been a most encouraging development of this industry. Texas is still the great cattle State, but in the rate of increase it has been surpassed by most of the other States. Iowa leads in swines, being credited with one-eighth of all in the United States, and showing the enormous increase of nearly 350 per cent. The magnitude of the dairy industry in New York is shown by the return of a million and a half cows, which is nearly double the number returned in any other State.

	Working Oxen.	*Milch Cows.*	*Other Cattle.*
Total	1,010,402	12,580,907	22,501,545
Grand Total			36,098,854

Sheep on farms in the United States	35,191,656
Ranch sheep	7,189,733
Total	42,381,389

—*Drovers' Journal.*

Dr. H. J. Detmers, sent to Texas by the Agricultural Department at Washington, is at present making his headquarters at San Antonio. His visit is an important one to the sheep and cattle interests of that State, as his mission is to investigate the diseases, their causes and remedy that prevails there. The lombriz in sheep is one of the most important points on which he wishes to report, and he asks as a special favor that any one that knows of the existence of lombriz, that he may be informed of it, and he will immediately proceed to the locality and endeavor to discover cause and cure for this scourge of the sheep men of South Texas. He also would be thankful for notice of any disease among imported sheep, as this is of great importance to the wool-growing industry. Spanish fever among cattle will claim a large share of his attention. With the assistance of the practical sheepmen of Texas, the doctor's visit can be made of great benefit to the

industry, and we hope that they will lend every assistance possible. His address will be San Antonio, until further notice. Telegrams giving information as to the existences of urgent cases of disease can be sent at his expense.

PET ANIMALS AS CARRIERS OF CONTAGION.—The *Sanitary News*, calling attention to this danger, says: The contagious feature of some diseases has been disputed by the incredulous, because no channel of communication could be discovered between the first and subsequent cases. Dr. William Bunce, of Oberlin, O., reports a case in which five children of a family of six were taken with diphtheritic sore throat, no source of contagion being discoverable about the premises. A cat in the barn was found to have the characteristic lesions of diphtheria, and inquiry elicited the fact that the cat had been fondled by the children during its illness. A few months later, this same observer lost a patient from diphtheria, who had a few days before charitably removed some obstruction from the throat of a pet cat, which, upon examination, was found to be diphtheritic false membrane. In these instances the cats were made the carriers of the contagion by contracting the disease, either from some preëxisting case among animals of their own kind, or among people who petted them, or it may be from some unsanitary surroundings.

THE EARLY DEVELOPMENT OF FAST TROTTERS is an interesting fact in the physiology of growth. It is, no doubt, a fact that "baby trotters" do not, as a rule, last long. But there are some remarkable exceptions to this fact. The records now show that a yearling has trotted a mile in 2:42½, a 2-year old in 2:21, a 3-year old in 2:21, and a 4-year old in 2:19¾.

We give below a table showing the names, etc., of these trotters:

Name.	*Desc.*	*Sire.*	*Rec'd.*
TWO-YEAR OLDS.			
Wildflower	b. f.	Electioneer	2:21
Fred Crocker	ch. c.	Electioneer	2:25½
THREE-YEAR OLDS.			
Phil Thompson	g. g.	Red Wilkes	2:21
Sweetheart	b. f.	Sultan	2:22
FOUR-YEAR OLDS.			
Trinket	b. m.	Princeps	2:19¾
Von Arnim	b. s.	Sentinel	2:22
Romero	g. s.	A. W. Richmond	2.22½

STAMPING OUT DISEASE.—In Ottawa, Canada, it is announced that in consequence of the cattle disease, which has for some time existed in Pictou, N. S., the government has given the Minister of Agriculture power to send a veterinary surgeon to visit the places where the disease is said to exist, and power to declare any place where the disease is found an infected district. He will have power to order any cattle he thinks proper slaughtered, and no person but he, or some other person ordered by the department, will be permitted to remove any cattle from an infected district.—*National Live Stock Journal.*

A MONSTROSITY.—*The National Live Stock Journal* mentions a colt having been dropped at High Hill, Missouri, being well-formed except the head,

which bore a remarkable rememblance to that of a human being. The upper part or top of the head was round, with prominent forehead; the opening for the eyes were placed as in a man, there were no eye-balls; the nose was a lump of loose skin, without opening; the upper jaw was short; the under jaw was shaped as in a man, but was longer, and had the under lip of the horse; it had no teeth; its ears were like those of a horse, and placed at the juncture of the head and neck. It lived about five hours, breathing through its mouth.

A Freak of Nature is reported in the *Live Stock Journal* (Eng.) "of a calf with a perfect head of an elephant, including a trunk six inches in length. It is explained that the heifer that gave birth to the creature was very much alarmed at the sight of an elephant belonging to a traveling circus." A subscriber, not entirely convinced of the truth of the report, calls for further particulars, with name and address of owner, and adds, "What is *explained?* I suppose hundreds of pregnant heifers and cows have been frightened by locomotives, but I defy any of your readers, or or any one else, to give one well-authenticated case of a calf being born with a funnel and wheels in consequence of such fright."

THE JOURNAL

OF

COMPARATIVE MEDICINE AND SURGERY.

VOL. III. OCTOBER, 1882. No. 4.

ORIGINAL COMMUNICATIONS.

ART. I.—RECENT DISCOVERIES OF FOSSIL HORSES.

BY J. L. WORTMAN.

THE contributions to the knowledge of the extinct Perissodactyla, or odd-toed ungulates,* demonstrate the actual existence of types heretofore hypothetically assumed. The living representatives, the horse, tapir, and rhinoceros, constitute but a small fraction of this large order, when compared with the fossil forms already known. One of these, however, the horse, displays the most specialized structure to be found within the limits of the order.

Many years have elapsed since the first discovery in the Tertiary rocks of Europe of horse-like remains, which were regarded by paleontologists in the light of direct ancestry of the living horse. Since then the discovery of the remains of these animals in the same geological horizons in this country, by Drs. Hayden and Leidy, has strengthened the belief in the descent of the horse from very different ancestral types. Entire skeletons, obtained from the "bone beds" of the West, display their osteological characters to such an extent as to leave no doubt as to their true nature.

* The modern representatives are the horse, (1 toe), rhinoceros, (3 toes), the tapir and the little hyrax.

It is much to be regretted, however, that many of these animals have received different names from different authors, a fact very conducive to confusion. The only way to obviate this difficulty is by strict adherence to priority in the employment of a name, provided it is accompanied by a competent description, and the use of such characters as will distinguish the animal named from its nearest allies. In order to help make the subject clear, I will give the names of a few animals that have been discovered during the past forty years.

In 1841 Prof. Richard Owen decribed the remains of a Lophiodon-like* animal from the London clay of Eocene age, to which he gave the name *Hyracotherium*, †. Subsequently he described a nearly allied genus, from the same deposit, under the name *Pliolophus*, ‡. In *Hyracotherium* the molar and premolar teeth are different, both above and below. In *Pliolophus* the last, or fourth inferior premolar, is like the first true molar, a character which separates the two genera satisfactorily. The specimens described by Prof. Owen do not display clearly the number of digits either possessed, but he expresses the opinion that *Pliolophus* has three toes on the posterior limbs.

In 1872 Professor O. C. Marsh discovered in the deposits of the Eocene age, three forms of fossil horse, these were distinguished as *Orohippus*, *Eohippus* and *Orotherium*. The last two forms are probably identical with Owen's *Pliolophus*, as *Pliolophus* is nearly allied to *Hyracotherium*, we may say that Hyracotherium was the most generalized form of the fossil horse known till recently. An other and near ally to the above form has been discovered by Prof. Cope

* The Lophiodons were first described by Cuvier. They were allied to the tapir. They derive their name from the structure of the true molars, which have their crowns crossed transversely by two crests or ridges of dentine, covered with a layer of enamel. The last lower molar has also a small posterior lobe. The premolars are more simple in structure and compressed, resembling the first premolars of the tapir. The upper molars also resemble those of the tapir, but approach, in some respects, those of the rhinoceros. The diastema, or toothless interval between the canine and pre-molar teeth, was much shorter than in the tapir. Several species have been described from the Eocene of France and England, but little is known of the skull or skeleton. No true Lophiodon is yet certainly known in this country.—O. C. MARSH.

† Transactions London Geological Society, 1841, pp. 203–208.

‡ Loc. Cit., pp. 54–72, 1858.

in New Mexico. This genus Cope has named *Systemodon*,* and assigns as his reasons for separating it from *Hyracotherium* the circumstance that it displays no diastemata spaces behind the superior canines, while in the latter there are two. This fossil (from New Mexico) was first described by him under the name *Hyrocotherium tapirinum*,† but the discovery of better specimens demonstrates its claim to the rank of a new genus.

We now turn to the description of a still older form than the above made known by Prof. Cope in 1873.‡ This is the *Phenacodus*. Its systematic position in the mammalian class was involved in considerable uncertainty till the discovery of the greater part of the skeletons of two distinct species of this genus by the writer in the Wyoming Wasatch during the summer of 1881, which afforded Prof. Cope the means of determining its true position and elucidating the many important and interesting points its osteology teaches. Prior to the discovery of these skeletons no characters had been found among the Perissodactyla that would justify the systematist in dividing the group into more than a *single* sub-order; but it is now necessary to separate it into *two* sub-orders. These Prof. Cope designates the *Condylarthria* and the *Diplarthria*.§ The characters on which this division reposes are to be found in the astragalus || and its manner of articulation.

It is sufficient to say now that the two sub-orders are well distinguished and that their discovery furnishes another link and one long sought in the evolution of the horse from earlier forms.

The *Phenacodus* of Cope, is the type genus of the *Condylarthria*. It possesses five well developed toes in functional use on all the feet, of which the first is the smallest; the medium is the largest, and is symmetrical within itself. The feet are considerably shortened, and were probably semiplantigrade; in fact, the feet of this animal constitute an approach to the Amblypoda. The dental formula is: Incisors, 3-3, 3-3; canines, 1-1, 1-1; premolars, 4-4, 4-4; molars,

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* Rept. U. S. Geol. Surv., W. 100th Mer., Capt. G. M. Wheeler, Pt. ii., Vol. iv., p. 263.

† Paleontological Bulletin, No. 34, Dec., 1881, p. 177.

‡ Paleontological Bulletin, No 17, October, 1873, p. 3.

§ Paleontological Bulletin, No. 34, December. 1881, p. 178.

|| A bone of the hock corresponding to the ankle-bone of man.

3-3, 3-3, 4-4; that is, 44 functionally developed teeth. The molars are of the simple four-lobed pattern, resembling in this respect the suilline Artiodactyla, or hogs and peccaries; in fact, on this account it is a matter of some surprise that the animal should turn out to belong to the Perissodactyla. Professor Cope has described five genera of this type.*

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* As the *Phenacodontidæ* (Cope) plainly present us with this hypothetical condition, both as regards the teeth and the number of digits on each limb, they cannot be regarded otherwise than as the primitive ancestors of the succeeding members of this important and once populous order. There has probably been no discovery among the ungulates since the finding of the *Amblypoda* that has proved equal in interest and importance to the discovery of this group. The descent of all the ungulates from the *Amblypoda* has been held by Prof. Cope for some time, but that it took place from any *known* genera of this order, the comparatively specialized condition of the teeth of the latter distinctly forbids This moderate complexity of the teeth among Eocene mammals is a striking exception, especially when associated with such a low grade of organization of other parts as we find in these animals. The explanation of this fact must, in my judgment, be sought for in their large size and in the possession of powerful canine teeth, which insure them greater immunity from the attacks of fierce carnivorous contemporaries. With these means of defense, they could take up their abode where food better adapted to their wants was furnished. Hence we can with perfect consistency look for a rapid modification of these organs, accompanied with slight change in others. In order to make the connection complete between them and the Phenecodonts, there should yet be found an Amblypod with bunodont molars, reduced canines and a more elongated foot. An approach to this condition, as far, at least, as the molars are concerned, is found in a new form recently described by Prof. Cope, under the name Manteodon (prophecy tooth). The *Amblypoda*, says Professor Cope in his Report on Capt. Wheeler's Survey (W. 100th Mer.), are as yet confined to the Eocene period exclusively, and are found both in Europe and this country. In points of affinity to the hoofed orders generally they occupy an interesting and important position; being in all probability the oldest, and affording the most generalized condition known among the ungulates. The brain capacity is exceedingly small in proportion to the size of the other parts of the skeleton, and from casts made from the brain case itself we are warranted in assigning these animals a position among the lowest mammalia; they are lower in brain development even than some of the *Marsupials*. The feet are very short, are provided with five fully developed toes, and have their entire plantar and palmar surfaces

The Meniscotheriidæ has been recently established for the reception of the single genus Meniscotherium, discovered by Prof. Cope in the Wasatch beds of New Mexico, and described by him in his report to Captain Wheeler. The recent discovery of the bones of the feet shows that they display the characteristic peculiarities of the *Condylarthria*, to which group it must be referred. Its digital formula is unknown, hence we must rely upon the specialized crescentoid pattern of the molars for the family definition. It is proper to remark here that reduction in digits in the Perissodactyla is usually accompanied by specialization of the molar teeth. In this case, therefore, I would venture the prediction that its digital formula will be

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applied to the ground, as in the modern bears. The astragalus is greatly

Right hind foot of a species of Coryphodon (Amblypod), one-half natural size (Cope).

flattened from above downward, and is primitive and characteristic. It displays on its inferior surface flattened articular facets for both navicular and cuboid bones, which share the articulation about equally. On the superior part, the surface articulating with tibia, it is almost flat, a condition which must have rendered the ankle joint capable of very little movement, and giving to these animals a peculiarly awkward and shambling gait It is not difficult to perceive that these small-brained, five-toed, and plantigrade *Amblypoda* could easily have furnished a starting point for both the *Artiodactyla* and *Perissodactyla*, and, as we have good reasons to believe, did give origin to the *Proboscidea* or elephants.

found to be 4-3, with the outer toes somewhat reduced. The value of the digital formula, as a character, in the definition of the families of the Perissodactyla is of high standard. This may, likewise, be said of the relations of the molar and premolar teeth, but in a less degree. The tubercular, or crescentoid structure of the molars, however, is capable of such intergradation, which increase of our knowledge demonstrates, that it must be accepted as provisional only, and not entitled to rank equal in value to either of the other two characters in defining the family.

The genealogy of the horse as now indicated is as follows:

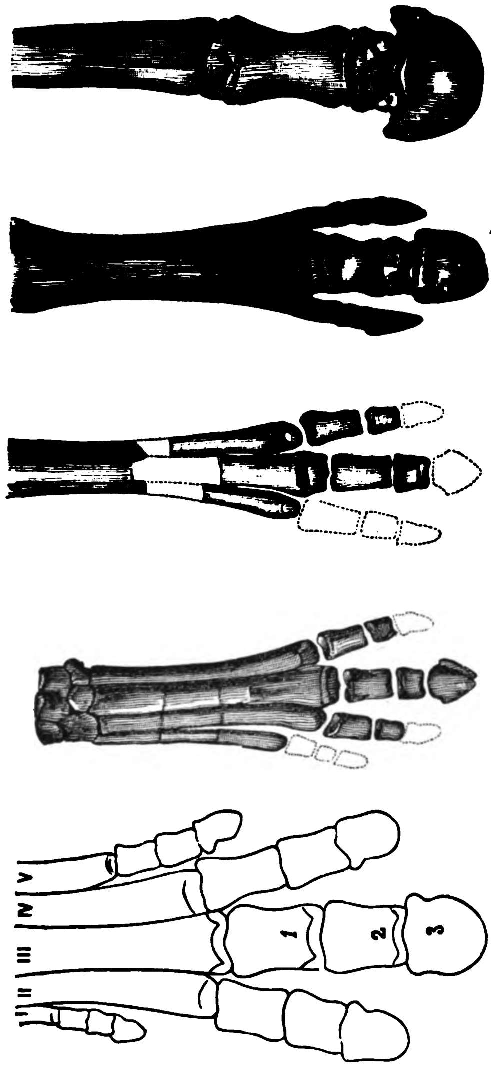
Diplarthria	Equus,	Equus,
	Protohippus,	Hippotherium,
	Anchippus,	Paloplotherium,
	Anchitherium,	
	Mesohippus,	
	Lambdotherium,	
	Oligotomus,	
	Hyracotherium,	
	Systemodon,	
Condylarthria	Meniscotherium,	
	Phenacodus,	
AMBLYPODA,		Hyodonta.

The cause of this digital reduction is an interesting inquiry Bunodonts* as a rule are dwellers in swamps and forests and live on nuts, berries, and roots. If they are compelled to forsake their natural habitat and live in the open field, either modifications or extinction will follow. Once in the open field speed becomes a desideratum as a condition of safety, and the foot with a reduced number of digits possesses many advantages over the polydactyle one.

Prof. Cope has shown (*American Naturalist*, April, 1881), that in plantigrade quadrupeds the extremities of the toes are arranged in a semi-circle, when they are all applied to the ground. In the act of running the heel and wrist are raised, throwing the weight of the body upon the median digits. An infinite repetition of this posture in digitigrade animals unable to withstand the attacks of their ene-

*Teeth of complicated structure, with high and uniformly broadened rowns, the face presenting a complex folding of the enamel plates.

EVOLUTION AS SHOWN BY THE FEET.



1. Left hind foot of *Phenacodus primævus*; half natural size (Wortman).
2. Left fore foot of *Hyracotherium venticolum*; half natural size (Cope).
3. Hind foot of same, a reduction of one toe from the fore and two from the hind foot.
4. Left fore foot of *Anchitherium aurilense*; one-fifth natural size (Gaudry).
5. Left fore foot of *Equus caballus* (modern horse); one-fifth natural size (Gaudry).

mies and whose only escape was in flight, the strengthening of the median digits, and the consequent reduction of the outer ones, would follow according to the law of use and disuse of parts. This subtraction of toes has progressed step by step until the modern one-toed horse has been reached.

ART. II.—THE TEETH OF THE HORSE AND THEIR DISEASES.

(*Continued.*)

BY R. JENNINGS, V.S.

The wolf teeth are last of the deciduous group to make their appearance in the mouth, usually between the first and second year. At this period the colt usually has a full mouth, or twenty-six deciduous or temporary teeth. A very important change is now going on in the jaws of the animal, which for simplicity of description the anatomical rule of writers on human anatomy will be observed. The reader will understand the term superior, ("upper, higher, denoting the relative position,") as relating to the upper jaw or superior maxillary. Inferior has the same reference to the lower jaw or inferior maxillary bone. The teeth of most animals offer some criterion by which to estimate with some degree of accuracy their age. This is chiefly accomplished by observing the natural changes in nature's onward course, which take place in the masticators; the periods at which they appear, are shed and replaced, and the alterations in their form and markings. In the ox the horns present legible indications of the advancing years. Reference to the teeth as indicating the age of the horse, is of ancient origin, as the writings of Xenophon, Hippocrates, and others from among the Greeks, and by several authors among the Romans, fully testify. In the selection of cavalry horses for the Grecian armies, all those having lost their dental marks were rejected. These facts were noticed by Varro, Columella, Vegetius, and other authors of more recent date, whose names live in history. We have now arrived at that period in the animal's life where the changes in the teeth mark with much certainty the age of the animal. While these positive indications of age are steadily going on, nature's attentive student will experience little difficulty in deciding the approximate age of the animal examined. The first notable change taking place in the development of the permanent teeth is the shedding or throwing off the first two pairs of the temporary molar teeth, one pair in the superior, and one pair in the inferior maxillary bones, which are replaced by the first pair of permanent molar teeth in either jaw, filling up the alveolar or tooth cavity so recently occupied by these transitory visitors; with these

come a second pair of permanent molar teeth taking their place, posteriorily to the third temporary molar teeth in either jaw. These rank in position as the fourth permanent molars. We now notice the first change taking place in the incisors. The first or middle pair are shed in either jaw, making room for the first pair of permanent incisor teeth. The wolf teeth usually disappear about the same time, though, in many instances, they remain in the animal's jaw-bone during their natural life. The colt is now approximating its third year. There are at this period of the animal's life eight permanent molar teeth; four permanent incisor teeth, and sixteen deciduous; total, twenty-eight. Between the third and fourth years, six pairs (12) permanent teeth make their appearance, of which four pairs are permanent molars, and two pairs are permanent incisor teeth. By this change the second pairs of temporary molars are shed, giving way to the second pair of permanent molars, the remaining two pairs taking fifth place in the molar group, the permanent incisors taking second place in the anterior superior maxillary bones. The colt has now eight permanent incisor and sixteen permanent molar teeth, with eight temporary teeth to shed off; total, thirty-two. Between four and five years old, the last pairs of temporary teeth are shed, the third temporary molars giving place to the third permanent molars, and the temporary incisors yielding to the third or last pair of permanent incisor teeth; with these come up two pairs of cuspidata or canine teeth, also called tushes. The sixth pair of permanent molar teeth complete the set, two in each jaw above and below. The animal has now a full set of permanent teeth, forty in number, and is no longer regarded as a colt, having arrived at mature age. As I have given some points which are new regarding the development of the horse's teeth from colthood to maturity, based upon my own investigations, and not formed from the expressed opinions of veterinary writers, I desire that my position may be fully understood; and in explanation, respectfully submit the following summary, which I believe will be easily understood. The . represents the decidious teeth in the order of development; the – the wolf teeth; and the figures represent the permanent teeth, in the manner of their coming, one pair in each of the three divisions of the maxillary bones, the anterior and two lateral; the first and fourth molars coming together, the second with the fifth, and the third with the sixth.

Deciduous teeth at birth or within a few days:

$$\frac{\cdot\quad\cdot}{\cdot\quad\cdot}\left\{\begin{array}{c}\dfrac{\cdot\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad\cdot}\\ \text{At Birth.}\\ \dfrac{\cdot\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad\cdot}\end{array}\right.$$

$$\frac{\cdot\quad\cdot\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad\cdot\quad\cdot}\left\{\begin{array}{c}\dfrac{\cdot\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad\cdot}\\ \text{At Four Months.}\\ \dfrac{\cdot\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad\cdot}\end{array}\right.$$

$$\frac{\cdot\quad\cdot\quad\cdot\quad\cdot\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad\cdot\quad\cdot\quad\cdot\quad\cdot}\left\{\begin{array}{c}\dfrac{-\quad\cdot\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad\cdot}\\ \text{At one to two years old.}\\ \dfrac{\cdot\quad\cdot\quad\cdot}{-\quad\cdot\quad\cdot\quad\cdot}\end{array}\right.$$

$$\frac{\cdot\quad\cdot\quad 1\quad 1\quad\cdot\quad\cdot}{\cdot\quad\cdot\quad 1\quad 1\quad\cdot\quad\cdot}\left\{\begin{array}{c}\dfrac{1\quad\cdot\quad\cdot\quad 4}{1\quad\cdot\quad\cdot\quad 4}\\ \text{Two to three years old.}\\ \dfrac{1\quad\cdot\quad\cdot\quad 4}{1\quad\cdot\quad\cdot\quad 4}\end{array}\right.$$

$$\frac{\cdot\quad 2\quad 1\quad 1\quad 2\quad\cdot}{\cdot\quad 2\quad 1\quad 1\quad 2\quad\cdot}\left\{\begin{array}{c}\dfrac{1\quad 2\quad\cdot\quad 4\quad 5}{1\quad 2\quad\cdot\quad 4\quad 5}\\ \text{Three to four years old.}\\ \dfrac{1\quad 2\quad\cdot\quad 4\quad 5}{1\quad 2\quad\cdot\quad 4\quad 5}\end{array}\right.$$

$$\frac{3\quad 2\quad 1\quad 1\quad 2\quad 3}{3\quad 2\quad 1\quad 1\quad 2\quad 3}\left\{\begin{array}{c}\dfrac{1\quad 2\quad 3\quad 4\quad 5\quad 6}{1\quad 2\quad 3\quad 4\quad 5\quad 6}\\ \text{From two to five years old.}\\ \dfrac{1\quad 2\quad 3\quad 4\quad 5\quad 6}{1\quad 2\quad 3\quad 4\quad 5\quad 6}\end{array}\right.$$

The permanent incisor teeth are narrow from front to back, and broad from side to side upon their upper surface, with an oblong cavity corresponding to the shape of the tooth in its centre, from two to three-eighths of an inch in depth, called the infundibula, better known as the cups in the teeth. Each incisor measures from two and half to three inches in length, and are firmly fixed in their sockets, their fangs or roots turned towards the centre of the jaw, the second pair folding over the centre or first pair, the third, or corner pair, folding in like manner over the second pair. These fangs or roots terminate in triangular points. The opposing surfaces vary in width and thickness as the animal advances in years, becoming narrower from side to side and deeper from before backwards, hence more triangular from year to year. To persons familiar with the anatomical structure of the teeth, these alterations are certain indications of age in the horse, even where the marks cease to exist, and the infundibula or cups have been obliterated. The natural wear of the incisor teeth is at the rate of one-sixteenth of an inch each succeding year, so by a close calculation a very fair estimate of the age of an animal may be made. It must be borne in mind, however, that there is a very great difference in the shape of the teeth in different animals, the horse with a shelly tooth being more triangular at their roots than one that is deeper or thicker. A strict observance of this rule would prevent very many errors which occur every day, even with men who claim to be experienced horsemen. The canine teeth, like the incisors, have but one fang, which is curved from without inwards. In the young horse they are sharp, externally convex, internally presenting two grooves on their surfaces, one on either side, and elevated in the centre. As the animal advances in years, these grooves disappear, the sharp points wear off, and the tooth becomes a rounded cone. These teeth are fully developed in the horse, but rarely or never in the mare. The molar teeth are placed at some distance from the incisors. The upper molars are about four times larger than the incisors, and the lower ones about three times as large. At maturity they measure from crown to root, or fang, about three inches. The upper molars may readily be known by their five projections or elevations upon their surfaces, while the lower ones have but four.

(*To be continued.*)

ART III.—A LESSON IN COMPARATIVE ZOOLOGY.

BY HUBBARD W. MITCHELL, M.D.

Whoever enters for the first time into the extensive field of Zoology, will see what appears to be a very wide difference among the various members composing the Animal Kingdom, and the theory so strenuously advocated by Agassiz and others, that each species was the result of a special creative act, might seem, upon first sight, a very plausible one. If we could accept this theory, then each species of animals could have sprung into existence fully formed, as a special act of creation, and the species would have remained immutable. The creation of species could have been at the pleasure of the caprice of the creative power, and a fish, reptile, mammal, insect, or mollusk could have been formed in this, or in any other order, as it pleased that power.

But such a theory is contrary to the teachings of modern scientific research. We can now see a regular and harmonious sequence in the order of creation, an order beginning at the lowest forms of life, and proceeding by slow, and regular, and gradual steps, up to the higher. This evolution of the living forms shows no abruptness, but a series of successive changes, where one form has, during considerable lapses of time, given place to another and modified form. On this principle of evolution, can be explained not only every form of life on earth now, but also all the extinct forms that have existed in past geological ages, and whose fossil remains are found in the various strata of the earth.

The different species of animals, both fossil and now living, have been evolved, the higher from the lower, during long lapsse of time, and modified by climate influences, and natural selection, or the "survival of the fittest." It might be interesting, if it were possible, to inquire how these changes have been carried on, so as to form, for instance, a lizard from a worm, an animal from a lizard, or lastly, man from an animal.

That such changes have taken place is beyond doubt. It is impossible to believe otherwise, when we follow the orderly series from a worm up to man.

Naturalists tell us that the first form of life was a cell—a cell or body containing within itself the power to divide and subdivide, and

in this way to give rise to other cells. In other words, to multiply by fission and growth. Now, if this is so, and I think we may safely assume that it is, let us apply this principle, and see if we can, by its aid, study the laws of evolution and ascertain how different forms of life came into existence.

A simple cell, then, was a living body, having, we may say, a round or an oval shape.

This cell by fission produced, we will assume, a dozen other cells.

Now, if this dozen cells were placed end to end, we would have a very respectable worm.

In the course of time changes of geological character took place, and made a higher grade of life possible, and the step to a lizard by the growth or addition of cells was an orderly one. From this primitive creature the higher order of saurians were undoubtedly evolved, until later, in the Triassic and the Liassic periods, the huge Plesiosaurus and the Ichthyosaurus were gradually developed. The step to a bird from these lizards was soon taken, a clearer atmosphere making it possible for them to live, and the curious Pterodactyle was evolved. Later on in geological ages, the Pterodactyles were slowly modified, their long fingers were shortened, and the bat-like web between them became covered with feathers and formed wings—modified cells still—and true birds came into existence.

In the Cretaceous period we find another order of animals retaining many saurian qualities, but pointing towards quadrupeds. The curious Iguanodon, the transition animal from the Ichthyosaurus to the next higher order, the Megalosaurus. Following our same principle, we have but to shorten the lizard's tail to increase the size of his head, body and limbs by adding a few more cells, or taking some of them away to form either of these animals. From the Megalosaurus we can pass by slow evolving steps to the mastodon, the rhinoceros, the hippopotamus, the tapir, and the elephant.

If we go back to the Megalosaurus we shall see that quadrupedal life modified from him gave rise slowly to the Felidæ, such as the lions, tigers, and panthers; the Canidæ, such as the wolf, jackal, and dog, and the hyena. From the Anoplotherium came the horse, ass, zebra, and, probably, also the different species of deer.

If now we again modify our primitive lizard, shorten his body and fore legs, and tilt him up on one end, we have the kangaroo. By modifying steps again, we can abridge the enormous tail

of this animal, make hands of his fore paws, and by slowly evolving steps the monkey emerges. By higher steps, and a modification of parts, a greater development of limbs into more perfect shapes, and a larger growth of the cerebral structures, and man comes, as the last and highest order of evolution.

In this long process of evolution, continuing through vast periods of time, an orderly sequence of the forms of life has been observed from the lowest to the highest. Climatic changes, geological changes, have been all-powerful in producing these changes of structure in animal forms.

I have left out of consideration a great number of animals, birds, fishes, and reptiles that would more clearly show this sequential evolution of species. Indeed, in a brief sketch like this, only the *plan* can be alluded to; a volume would be needed to describe the process, if description were possible. But perhaps enough has been said to show that animal life could easily have begun in a single cell, and that during *immense geological ages*, modifying influences of climate and of the atmosphere, the emergence of the land from the sea, and the introduction of vegetation in the carboniferous age, the further influence of natural selection, have been sufficiently powerful to produce one after another the animal forms that have lived and flourished on the earth.

We see now that all the animal tissues are made up of cells, modified so as to produce bone, tendon, nerve, muscle, and so on, and in the vegetable world, the soft petals of flowers, and the hard sharp thorns of some plants are *cells* modified to form these various parts. So, in the past, a few cells made a worm, a few more added and modified give the worm feet and a distinct head, then he became a saurian. More cells added to his body and fewer put into his tail, and he forms a *quadruped*, and so *he* goes on modifying, new forms arise, as new modes of life become possible, and thus higher orders are evolved. Meantime geological changes are taking place, and some of the earlier forms now find these changes incompatible with their life, and they die.

I believe that if we could find *all* the forms of life that have ever existed on the earth, from our worm up to man, we should see a gradual development upward, and that there would be no "missing link."

In glancing back over this long array of regular, orderly evolution

of life, which has at last culminated in man, Figuier asks if there may not arise in the future some being that shall be as superior to man as man is superior to the animals below him.

Perhaps some of the later human species can answer his question.

Having entered the wide field of Zoology, we see before us a multitude of animals of different forms, sizes, colors and habits. At first view there does not seem to be the least similarity between any two of them. All appear totally different and distinct.

Here the naturalist and the comparative anatomist steps in, and begins to study this great mass of animal life, and see upon what plan, if any, it is formed.

He begins by comparison. He compares one form with another, and sees if any two or more animals have any qualities in common. If so, he assigns them to some order and species, and in this way he simplifies their study.

Let us apply this principle of comparsion, in practice. Suppose we see together for instance the following:

A Pig, Tapir, Peccary, Elephant 1
A Lion, Tiger, Panther, Cat 2
A Dog, Wolf, Fox, Jackal 3
A Goat, Deer, Ox, Sheep, Camel 4
A Horse, Ass, Zebra 5

How shall we compare them, in order to find features common to any two or more of them?

Perhaps the feature that strikes us first would be the horns in the ox and the deer. Can we associate these with any of the others?

If we examine the teeth of all the animals in the first, second and third lines, except the elephant, we shall find them sharp and cutting, with long canine or prehensile teeth, admirably adapted for seizing and holding living prey, and for cutting and tearing it. We should, therefore, call these animals carnivorous. If we examined the teeth of the animals in the fourth and fifth lines, we shall see that they have large flat surfaces well adapted to chewing and grinding, and as they live on vegeteble substances, we should call these animals herbivorous.

Comparing still further, we find that in the horse and the ox, both herbivoræ, the horse has incisor teeth in the upper and the lower jaw, while in the ox there are incisiors in the lower jaw only, and this arrangement of teeth has a direct relation to the different structures

of the stomach in the two animals, the ox having a complicated stomach with four pouches adapted to a mode of digestion by which the food is prepared for a second mode of mastication. This order of animals, those in the fourth line, are called ruminants.

The animals in the fifth line have simple stomachs, and do not ruminate.

If we again compare the ox, this time with the deer, we shall find that while both are herbivorous ruminants, and both have horns, in the ox the horn is hollow and remains firmly attached to the animal's head through life, in the deer it is solid and is shed every year.

Upon looking further we find that the pig, tapir and peccary, carnivorous animals, have a cloven foot like the herbivorous animals in the fourth line, and those last again, are different from the herbivorous animals in the fifth line, which have a solid hoof or foot.

These comparative studies will enable us to classify animals into different orders and species.

Naturalists tell us that certain animals sprang from a common stock, and the differences between them are the results of modifications of structure gradually occurring during long periods of time. Thus the pig has a stout rounded body and a mobile nose. The peccary is a step higher. Then in the tapir, the body is about the same, but the nose is decidedly more developed. The rhinoceros comes in next with the same form of body, and his nose modified and turned upwards into one or two horns, and lastly the elephant, with his long mobile nose or trunk, is the highest expression of this common stock.

The order Felidæ, or cats, are almost precisely alike, the differences being chiefly of size, color, and growth of hair. The lion, tiger, panther, leopard, puma, and cat certainly sprang from a common stock. The domestic cat, perhaps, having the highest development from the fact of its ability to rotate the radius upon the ulna, a motion the larger cats do not have. We see the grace of this motion when our cats play with a mouse or a ball of yarn.

The same fact is seen in the Canidæ, or dogs. They came from a common stock also. The wolf, jackal, dog and fox are of the same species, and have the same structure.

In the Gramnivorous Ruminants, the origin from a common stock is apparent. The sheep, with its woolly coat and curved horn, undergoes a slight modification, and we have the goat, also with a curved horn and woolly hair. A further development gives us the deer, and

further still the ox. Then comes the camel, and lastly the camelopard, or giraffe.

As an interesting instance of the structure of animals conforming to their modes of life, the giraffe may be mentioned. This animal feeds upon the foilage of trees. Upon his head he has tufted sensitive horns that he may *feel* his food as he passes along. His elongated neck enables him to reach it easily, and in order that he may be on the lookout for his enemies, the crouching lion being his most dreaded enemy, while his head is so high above the ground, his eyes are set so that he can see above, below, forwards or behind without moving his head.

The complicated digestive apparatus of ruminants has some relation to their methods of escape from danger. As their food consists principally of vegetable substances, little nutritious and demanded in large quantities, and as they are in turn food for the ferocious carnivorous animals, their only means of safety is in flight, while mastication is a work of time.

They are, therefore, obliged to graze rapidly, fill their large stomach reservoir with unchewed food, and then retire to a place of safety, where they can re-masticate it at leisure.

The horse, ass, zebra and other animals of this order sprang also from a common stock.

We have now seen that by comparing animals with each other we are able to classify them into orders and species, each order and species having some distinctive character entitling them to a fixed and permanent place in zoological classes.

If now we examine all the forms of animal life on the earth, the fauna, or the animal kingdom, we shall find that they can be comprised under *four* great heads—namely, Vertebrates, Articulates, Mollusks, Radiates.

It is with the *first* of these only that this paper will deal.

As we saw that animals were classified under several heads by examining them externally and internally to a limited extent, and this classification gave us Carnivoræ, Herbivoræ, etc., so now if we examine this immense order of Vertebrates by the study of their bony frame-work, or *osteology*, we shall find that all, from an eel up to man, are constructed upon one single plan.

Beginning with man and descending in the scale, we will briefly examine this bony frame-work, or skeleton, and see what this plan is upon which such a vast part of the animal world has been constructed.

First we find a skull, rounded in shape, hollow, having apertures for the eyes, mouth, etc., jaws set with teeth, and articulated upon the first of a series of bones, or vertebræ. These vertebræ joined together by ligaments so as to form a continuous column, or backbone, mark the distinctive features of the whole order—viz., Vertebrates.

From the upper part of this spinal column are given off twelve pairs of ribs, which, nearly meeting in front, form a bony cage containing the heart and lungs.

The uppper extremities are formed by a scapula and a clavicle, a humerus, radius, ulna, carpus, metacarpus and phalanges.

At the lower end of the spinal column is the pelvis, from which is given off the femur, the tibia and fibula, the tarsus, metatarsus and phalanges to form the lower extremities.

This briefly is man.

In the Simiidæ, or monkeys, the facial angle is a little greater, the humerus, the radius and ulna a little longer, the tarsus slightly modified, and in some species the vertebræ are extended into a tail. These are monkeys modified a little from man.

In the Felidæ and the Canidæ, the facial angle is still greater, the teeth sharp and cutting, with well developed canines, the upright position is changed to a horizontal posture, the upper extremities are now fore limbs, bones modified in shape, species mostly digitigrade. The bears are all plantigrade.

General plan same as man.

In the remaining members of the Carnivoræ, as the sea lion, seal and walrus, the fore limbs are modified into paddles, while the hind limbs are less developed. In the walrus the lower incisors and canines are absent, while the upper incisors are elongated into tusks.

General plan same as man.

In the Bovidæ, beginning with the camels and running through the llama, giraffe, ox, bison, yak, goat, zebu, gazelle, gemsbok, sheep, antelope and deer, we have an elongated skull, modified bones of the fore and hind limbs, and a modification also of the carpus and metacarpus, the tarsus and metatarsus, whereby the foot is cloven, owing to a consolidation of some of these bones. In some of the members of this order we have the horn, either deciduous or permanent, and in all the cauda. In some, also, we have a longer scapular and longer spinous processes. This affords greater attachments to the nuchal ligaments and muscles for those animals with heavy heads and

horns. In the giraffe this is especially noticeable. The fore shoulders are so high that it makes the fore legs seem higher than the hind legs. This is due to the lengthened scapula and spinous processes. The heads of the femur and humerus are on the same level.

In all other respects, the general plan is the same as man.

In the Cetacea, as the porpoise, dolphin and whale, the skeleton is the same, except the hind limbs are modified into complete or rudimentary fins.

In the extensive orders of Insectivora, Rodentia, Edentata and Marsupalia, the general plan is that of the higher animals, and of man, modified to meet the requirements of its mode of life.

In the enormous class of Aves, or birds, beginning with the robin and ending with the penguin, we have the elongated skull ending in a beak or bill, light porous bones, an extensive sternum, clavicles united, to support the wings, various modifications of the humerus, radius, ulna, and the carpus, metacarpus and the phalanges, as in the bats, etc.

In all the species of birds, the general plan is the same as man.

The same is true of the class Reptilia and Amphibia. In some of the snakes the legs are rudimentary, in others the ribs serve as legs. In the sharks the fins take the place of the fore and hind limbs.

In the class Pisces, or fishes, through the whole series down to the eel, we have the skull, vertebræ and ribs, and the bones of the fore and hind limbs are more or less perfectly represented by the fins. The pelvis in fishes is rudimentary, or wanting.

This brief sketch of the Vertebrata, from man to the lowly eel, shows that the whole sub-kingdom is formed upon a single plan, and that any variations are but simple modifications designed to meet some special requirement. The study of osteology shows us that in this long line of animals—the Vertebrates—the distinctive feature is the spinal column, and it is astonishing, as well as interesting, to observe how little difference there really is between the backbones of any two members of the whole series. The chief differences are in the structure of the head and limbs.

If we compare the anterior limbs of some of the lower animals with the arms of man, we shall see that bone for bone is present, from the humerus to the phalanges. For instance, take the anterior limb of, say, an ape, a bat, a dog, a mole, a deer, a whale, a seal, a tortoise, a fish, or a bird. In each we can distinctly trace the hu-

merus, the radius and ulna, the small bones of the carpus and the metacarpus, and the phalanges.

The differences of shape in each animal are simply modifications of the same bone to adapt it to its individual mode of life.

The intelligence of animals, no doubt, resides in the brain, and it is believed that the amount of the reasoning power, or faculty, is in some way proportioned to the quantity of *gray matter* of the brain.

In connection with the reasoning power of animals, depending on brain action, may be mentioned a provision of nature for the safety, which—although it has nothing to do with reason—acts in connection with it.

This is the *mimicry* of animals, or the adaptation of the color of an animal to that of surrounding objects in its native wilds.

Nature excites our wonder by her wisdom of this curious and interesting provision.

Thus the tiger, so beautifully decorated with black stripes upon a ground of reddish-yellow fur, tending to white below, living in the long jungle grass of Southern Asia, with the color of which its stripes so closely assimilate, it is impossible for an unpracticed eye to discern it even at a short distance. This mimicry not only protects the animal's safety, but enables it to steal unseen upon its unsuspecting prey.

The uniform dun color of the puma gives it a mimicry for its safety and attack, while crouching upon the branches of trees.

The dark circular spots upon the skin of the leopard give it a mimicry that utterly deceives, as it conceals itself among the leaves of bushes and trees.

The giraffe has, perhaps, the most astonishing mimicry of any animal. Inhabiting as it does the forests of Africa and feeding upon the boughs of trees, its great size makes it a most conspicuous object. Its most dreaded enemies are the stealthy lion and man. In the regions it most frequents are many dead and blasted trunks of trees, and its mimicry is such that the most practiced eye has failed to distinguish a tree trunk from a giraffe, or a giraffe from a tree trunk.

Reliable accounts have reached us where lions have gazed long and earnestly at a motionless giraffe, and being in doubt whether it was a tree or not, have actually turned and skulked away.

Mimicry exists more or less throughout the animal kingdom. Trusting that what has been said above will awaken a proper interest in this wide and extensive subject, and lead others to enter the field

where there is so much room to labor, and where so little has been done, I will close this brief lesson in comparative zoology.

ART. IV.—THE CARE OF CUTANEOUS DISEASES OF THE ELEPHANT IN CAPTIVITY.

BY DR. MAX SCHMIDT.
(Director of the Frankfort Zoological Garden.)

Abcesses are often formed under the hard epidermis plates in the skin of the elephant. They are generally small, ranging in size from that of a pea to that of a hazelnut. Being covered by the fixed skin, they cannot readily find an opening on the surface. They are usually discovered accidentally by the painful movements of the animal while it is being cleaned whenever the sore spots are touched.

In several instances elephants have been known to carry, by means of their trunks, the hands of their keepers to the painful place. These abcesses are principally caused by the penetration into the skin of filth and foreign matter, such as grains of sand, slivers of wood, etc. The treatment consists simply in thinning down the epidermis until the small pus sac is opened.

Sometimes it is necessary to assist the emptying of the abcess by a slight pressure of the hands from both sides. A cure results without further treatment.

The already thick skin of the elephant frequently gets remarkably thick in single spots, or on a large part of the body appearing like layers laid one upon the other, and covered over with crusts of dust and dirt. This is caused by the neglect of bathing, rubbing and scouring the skin of the animals in captivity, whereby the old epidermis layers are loosened and removed.

As a rule, these crusts are most noticeable in elephants exposed by travelling menageries to dusty roads and housed in filthy stables, whose skin is not only not cared for, but is rather injured by the rubbing on of fat, oil and coloring matter to make them look darker. If left alone these crusts become dry and hard, pressing the skin underneath by each movement or crack, thereby forming very painful chaps.

Collections of skin tallow are often formed under these, which have the appearance of pus formations, irritating the skin by pressure and straining, so that abscesses and tumors may readily be the result. To prevent the occurrence of the conditions above described it is necessary to take special care of the skin of the elephant. If the animals are received young and directly imported, all that is necessary is to keep the skin clean by rubbing it daily with a hard brush, and, in favorable weather, to wash them with water, or, if possible, to let them bathe. Thus the skin will be kept smooth without artificial aids. The greater number of elephants do not arrive at the zoological gardens until after they have been with travelling menageries some time, and their skin is found to be in a filthy condition. It will be necessary, then, to wash the animal thoroughly, using green soap and warm water when the epidermis is greasy. After the washing, and whilst the skin is still soft, the thick dirt and epidermis crusts should be carefully removed by rubbing them with a piece of pumice stone or scraping them with a small iron scraper, until the normal thickness of the skin has been again restored. This takes much time, and must be done carefully, so that the animal, which often becomes impatient, be not injured or provoked to resistance. If oil be not applied after this treatment, the epidermis will become dry and brittle, and chaps will form. To retain the necessary softness it should be applied the day after the skin has been washed. Oil alone should be used for this purpose, applying it with a cloth rather than with a brush, and put on as thin as possible. The oil should be used very seldom, and never except after the skin has been previously cleaned. Dirt accumulating on the oiled skin should be daily removed. Glycerine has lately been tried instead of oil, with the best results, the old crusts loosening more easily, new ones not forming, whilst the skin becomes remarkably soft. The washing must be done only during mild weather, as it might lead to colds, and should never be attempted during the winter months.

ART. V.—SOME DISEASES OF THE FOOT.*

BY HENRY C. SLEE.

KNUCKLING AT THE FETLOCK may arise from disease of the joint, from unskilful paring of the foot, or from excessive strain. Too great length of toe may bring an unnatural strain on the posterior tendons; or pulling too heavy loads may have the same effect, especially in young horses. In some cases the cause is obscure, corresponding apparently to the weakness of the ankle joint so common in scrofulous human beings—a natural weakness of the tendons—and as the great strain is brought to bear upon the flexors, when sufficient exciting cause is applied, a sub-acute inflammation is set up, an exudate is poured out on the tendon fibres, which diverts them from their naturally straight course, and consequently contracts them. The corresponding weakness in the anterior tendons allows them to relax, but not being subject to the same strain, inflammation does not attack them. The perforans and perforatus tendons only are involved—differing from the condition known as "knee-sprung," where the flexors of the metacarpus also are involved.

If the column of bones is distorted from its natural bearings by abnormal position of the foot, we may as a result have knuckling at the fetlock, or descent of the fetlock, or sprung knee—one or other of these conditions depending on the form of the limb. If the humerus is short, and thus greater strain put upon the knee, when this predisposition exists, the animal is apt to become "knee-sprung" instead of "knuckled." Contraction or tenderness of the heels, causing a flexed position for relief or inability to bring the foot fairly down, may cause contraction of the tendons, and if the knees be well formed may result in "knuckling;" or the inflammation originated by contraction of the heels may extend to the naturally weak tendons.

The treatment is only palliative. If attended to early, the disease may sometimes be easily averted until a recurrence of the exciting cause. The foot should be carefully put in proper shape,

* From notes of lectures on Pathological Shoeing delivered by Dr. E. A. MacLellan before the Columbia Veterinery College and School of Comparative Medicine.

the inflammation reduced by treatment according to its intensity in each case, chloroform liniment generally being best. In some cases, a high-heeled shoe, in others the lowering of the heels, is necessary to relieve the tendons of strain, and the joint will return to its normal condition. High toes sometimes do harm by increasing the inflammation. In cases of long standing, after properly adjusting the foot, blistering and even firing, succeeded by a period of rest at grass, often proves beneficial.

In cases which resist all other treatment tenotomy may be resorted to. The extent to which the tendons will be replaced is surprising. A gap of four inches has been known to be filled up in six weeeks.* The new tendon thus formed is generally thick and clumsy. Great care must be taken in adjusting the foot—bringing it so directly under the line of the leg that the pressure may be equalized.

In old cases the ligaments also become affected, so that the joint is hardly likely to be held in position long if straightened, and will never resist strain; but the form of the joint may be temporarily restored even in very bad cases by tenotomy.

LAMINITIS.

The name simply implies inflammation of the laminæ, and is hardly comprehensive enough; for a diseased condition of both cartilage and bone frequently accompanies it. In its simplest form, however, it is an inflammation of the sensitive laminæ, with a tendency to destruction of the whole foot.

The predisposing causes are:

I.—Excessive fatness. Whether this affects the predisposition in any manner other than adding to the weight, seems improbable; but it is no doubt sometimes a predisposing cause.

II.—Bad shoeing. The laminæ are naturally placed in such a direction that they receive the pressure in the line of their greatest strength, and if, by raising the heel too high, etc., the weight is diverted from this line and exerted in another direction on them, inflammation is the result. Thinning of the sole is a common cause under this head. The wall, deprived of its support at the plantar surface, either contracts or expands, and the laminæ suffer in either case.

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*Case: Dr. G. H. Berns, Brooklyn.

III.—Badly formed feet. Horses with too wide feet are generally subject to laminitis.

The exciting causes are:

I.—Concussion. The violent concussion, either in rapid driving or hard pulling over pavements, causes over-stimulation of the laminæ, and great determination of blood to them, and before this has had an opportunity to subside by gentle exercise, if the animal is placed in the stable, with the feet distended with blood, one of the great factors in the return of the blood to the heart (*i. e.*, exercise) is taken away, and inflammation is the result.

II.—Exhaustion. When, from any cause, the animal becomes exhausted, the weakest part is sure to suffer. Even while standing in the stable the laminæ have to sustain the weight, notwithstanding they may be exhausted with over-straining. Sometimes, when lame, one foot cannot sustain the weight,the other foot,having to do double duty, becomes exhausted, resulting in laminitis. The well-known tendency of sea voyages to produce laminitis can be traced to this cause, the constant effort to stand straight causing a strain on the laminæ, with consequent exhaustion.

III.—Rapid changes of temperature. If, while over-heated, the animal drinks cold water, the effect is to drive the blood to the surface and the extremities; exposing heated horses to cold wind, as may often be observed on ferry-boats, drives the blood from the surface, and with the same result of determination to the laminæ; and the laminæ, being already, perhaps, in a semi-diseased condition, from some of the predisposing causes, and possibly the feet being unable to relieve themselves by sweating, laminitis is the natural result.

Washing horses while hot (by the hose with cold water) is apt to set up a passive congestion which will develop laminitis very quickly if the predisposing causes have been at work.

IV.—Purgative medicines have sometimes induced this condition.

V.—Localization of fever in pneumonia, entiritis, etc. The feet are peculiarly liable to take on this disease from an irritable condition of the system, owing doubtless, to their position and anatomical construction.

The symptoms are usually developed in one night. In the morning the animal exhibits a disinclination to move; the pulse is full and bounding; respiration hurried; the feet hot and dry, and tapping

them gently with a hammer evidently causes great pain; the animal will resist any effort made to raise the feet; will give evidence of great suffering, and will probably sweat. If the two fore feet are involved they will be advanced, and the weight thrown upon the heel, the hind feet brought well under the body so as to relieve the fore feet in sustaining the weight. If the hind feet are involved they will be thrown forward with the weight on the heel, and the fore feet well back. If all the feet are involved they will be lifted alternately with every evidence of pain. If an effort is made to move the animal it will not move its feet until its head is so far turned round that it moves apparently to regain its balance, and if started forward will probably stumble so as to almost strike its nose against the ground. If it has opportunity it will lie down on one side, with head and legs stretched out, and on being compelled to rise will evidently suffer terribly until the feet become accustomed to the weight. In walking the feet will be advanced and the heels brought to the ground first, and if the hind feet are unaffected they will be brought forward with a jerk to relieve the forward feet.

There may be simple congestion which will readily yield to treatment; or there may be active inflammation, which may terminate in resolution; or the sub-acute or chronic form of the disease may be developed—the latter usually depending for their continuance on structural changes. The exudation may be liquefied and absorbed, or may go on to suppuration; the inflammation may extend to the pedal bone, and periostitis, ostitis or necrosis result. If the disease does not yield to treatment within a week, the sub-acute form is generally developed, and with this come dropping of the sole, turning up of the toe, seedy toe or pumiced feet. These deformities of the toe are due to the exudate pressing between the horn and the bone, forcing the horn up and the bone down; the sensitive and horny laminæ are separated, and the tension on the flexor tendons forces the bone down; the nutrition being interfered with, an unequal growth of horn is the result; and the imperfectly formed horn from the sensitive laminæ constitutes "seedy toe." One cause of the turning up of the toe is the greater growth of horn at the posterior portion of the foot, where its growth is less interfered with, and as it forces itself forward and almost under the toe, the latter, not growing in proportion straight down from the coronet, is turned up. This condition may be aggravated by improper

shoeing—throwing too much weight upon the toe. Atrophy of the antea-spinatus muscle often accompanies this condition.

Laminitis is a disease in which preventive treatment may and should always be adopted; and one of the principal things in this is good shoeing. If the foot is very flat and wide, clips should be placed on the outside of the shoe, and the shoe allowed to rest upon the sole if it can be borne. The animal should not be driven when his feet are overgrown or hard, nor should an animal from the country be overworked on the city pavements until accustomed to the change. When Western horses are brought here their feet gradually change in form—if rapidly, lameness results; but if slowly, only slight inflammation is induced, which, however, decidedly predisposes to laminitis. The feet should not be allowed to become too dry, and the animal should always be moved about until gradually cooled after being heated. When excessively lame on one foot, the well foot beside it, bearing the extra strain, should be carefully watched and not allowed to become inflamed. In many cases it is better to put the animal in a sling than to allow it to keep the additional weight on one foot for a long time; and wet cloths should be applied to keep-down incipient inflammation.

After the development of the disease the treatment must vary according to the intensity of the inflammation and the form of the feet. If the feet are thin-soled and flat the shoes had better be left on, but if comparatively strong the shoes may be removed, and the animal placed on a deep soft bed, the feet soaked in water and large poultices applied. This soaking and poulticing must be kept up and large doses of nitrate of potass administered internally. On the second day the following powder may be administered two or three times during the day:

Calomel, grains, xx.
Bismuth subnit., ℥ ii.
Morphia, grains, ii. to iii.

the amount of morphia being regulated by the intensity of the pain.

Great care must be observed in keeping up the anti-flogestic treatment incessantly until all danger has passed. In the very early stages sweating is sometimes of service, but not after the disease has fully set in.

After the inflammation has subsided the cause of the disease should be removed by proper shaping of the foot, etc.

In later and severer stages the feet should be soaked for an hour or more in hot water; and after that, cold poultices applied. Aconite may be given if the fever is high, and the pain relieved by opium.

When the acute symptoms have subsided the feet should be soaked in cold water, and iodide of potassium administered internally.

In shoeing in the sub-acute or chronic form of this disease, the heel should be lowered, the shoe set well back from the toe, and as much sole-pressure allowed as the nature of the foot will admit of. Clips should be turned up on the outside of the shoe to prevent the foot spreading. In some cases a bar shoe should be applied and frog-pressure allowed. If, as is often the case, the sole is found worn away in front of the frog, so that it will yield on slight pressure, a leather sole may be applied, and the shoe nailed on over it.

EDITORIAL DEPARTMENT.

INSANITY IN THE LOWER ANIMALS.

THE late Dr. Lindsay, author of "Mind in the Lower Animals," was a very enthusiastic expounder of the doctrine that all animals had some mind, including reason and consciousness, and that not a few were quite the superiors of men. In one of his volumes he calls attention to the subject of mental diseases in lower animals, and thinks that veterinarians could not be better employed than in studying this hitherto neglected department of pathology. Animal insanity is much more frequent than is supposed. It will explain many things in animal behavior often attributed to stupidity or viciousness.

The forms of the disease which are to be looked for are:

1. Idiocy and imbecility, which are simply different degrees of a congenital weak-mindedness.

2. Dementia, a loss of mind in the previously intelligent.

3. Mania, which is a term for madness in general. It may be (*a*) acute, or raving mania; (*b*) chronic; (*c*) it may be of a depressed form, when it is called *melancholia*.

4. Monomania of various forms may exist. Thus the animal may have a mania of suspicion, or for biting, or suicide, or a sexual mania, erotomania. The disease may chiefly affect the moral nature, and the animal become violently vicious.

1. Regarding idiocy, it is described by Pierquin. Darwin refers to imbecility in a dog, and describes its senseless habit of rotation or gyration. This is a common phenomenon of insanity in that animal. It is important to recognize imbecility if it exists, since much labor in attempts to train and educate animals may thus be spared.

2. Dementia is brought on in the horse, mule, cat, dog, etc., by blows on the head, passion, fright, meningitis and encephalitis. Pierquin describes a lively and intelligent parrot demented by the fright of a naval battle. Dr. Major asserts that the pathological changes (atrophy and degeneration) in dementia in the dog resemble those found in man.

3. Acute mania is often recognized. It should not be confounded with rabies, of which mania is only one symptom, and that not uniformly present.

Acute mania is generally ascribed by veterinary authors to acute inflammation of the brain or membranes, but this view is certainly not always correct.

It cannot always be easy to distinguish acute mania in animals from exaggerated passion.

(*a*) In chronic mania the mind, though disordered, has only occasional periods of excitement. The rogue elephants of India are assigned to this category. Baker describes a case occurring in a bull hippopotamus. The occurrence of chronic mania in the domestic animals is not rare, but as they are generally soon killed, little opportunity for studying or recording their symptoms is given.

(*b*) Melancholia is a form of disease to which some animals are predisposed. Such are the loris and certain monkeys. Homesickness is sometimes a cause of melancholia in such animals as the cat and dog.

(*c*) The various forms of monomania such as erotomania, kleptomania, dipsomania (e. g., Jumbo?), moral insanity, are discussed by Dr. Lindsay, who affirms that their distinguishing characters are easily made out.

VIRGIL AS A VETERINARY POET.

Virgil's Description of the Death of an Ox.—The genius of Virgil did not disdain humble themes. In the Georgics he gives faithful descriptions of rural life, descriptions that are often full of poetic beauty. He becomes here the poet of the farmer, and in some places we might add of the veterinarian. The common diseases and accidents of the sheep, cattle and horses were evidently well known to him, and some are quite fully described, "Morborum qouque causas et signa." One passage in particular (Book III. 478-515) decribes the death of a ploughman's ox, as critics have affirmed, from anthrax, though the diagnosis is not so easy.

A fatal murrain has swept over the land, killing both wild and domestic animals.

"Sarpe in honore Deûm medio stans hostia ad aram
Lanea dum nivea circumdatur infula vitta,
Inter candantes cecedit moribunda ministros.

* * * * * * * * * * * *

Ecce autem duro fumans sub vomere taurus
Concidit, et mixtum spumis vomit ore cruorem
Extremosque ciet genutus, it tristes arator," etc.

Which Dryden translates as follows:

"The victim ox, that was for altars prest,
Trimmed with white ribbons and with garlands drest,
Sank of himself, without the gods' command,
Preventing the slow sacrificer's hand."

And again:

"The bull, which to the yoke was bred to bow
(Studious of tillage and the crooked plough),
Falls down and dies; and dying, spews a flood
Of foamy madness, mixed with clotted blood."

In the same connection he describes most vividly the effects of the disease upon horses. The clinical symptoms resemble more those of glanders.

Possibly a reading of Virgilius Maro might improve the veterinary student's professional knowledge as well as his Latinity.

MASSAGE IN VETERINARY THERAPEUTICS.—The use of rubbing, kneading and similar movements has been rapidly gaining in favor of late. Especially is this the case among the German veterinarians connected with the army.

Dr. Paul Marggraff has contributed an interesting review of the matter to the Adam's *Wochenschrift für Thierheilkunde.*

For easier reference and description, the different forms of massage have received different names:

1. There is first the *effleurage,* or superficial rubbing, which consists in giving long, gentle strokes of the hand from the periphery toward the centre. This motion empties the superficial veins and lymphatics. It is very useful in bruises and sprains of the joints.

2. Next is *massage à friction,* which is a more active application.

It consists in similar but firmer strokes, from periphery to centre, combined with circular movements around the part or limb. The hand makes strong mechanical pressure.

As might be inferred, these movements are more applicable when inflammatory products have already been thrown out. They are most useful, therefore, in long-standing troubles, galls, chronic inflammation, etc.

3. *Petrissage*, or kneading, consists, as its name implies, of relaxing, catching hold of individual parts, pressing, squeezing, pinching, etc. Its action is much like that of friction massage (No. 2), but is deeper.

4. *Tapoltement*, or beating, consists in striking the diseased part with the fist or the edge of the open palm.

It is used in paralysis, not of central origin, in order to irritate the nerves and muscles.

Massage is most applicable in joint diseases. That it has a notable mechanical effect here is shown by an experiment of Mosengeil's. He took rabbits and injected India ink into various joints. Some of the joints he massaged, others not. He then opened the injected joints. Those that had been rubbed were almost free from ink, which could be seen coloring the out-going lymphatics for some distance. In the other joints the ink was found in abundance.

Pure glycerine is recommended as an agent to be used in massage, rather than sweet oil, which soon gets rancid. As a rule, massage should be done twice daily for from five to twenty, or in chronic troubles, thirty minutes each time. After the rubbing it is sometimes well to lead the animal about quietly for five or ten minutes, then cover the parts with warm and moist applications.

Massage is one of those forms of treatment which will give good or no results, according as it is carefully and conscientiously used.

The Test for Glanders by Inoculation.—The question, how can the veterinarian say positively whether or not a horse has the glanders, is, according to M. Ad. Rene, now settled. The dog, the friend of man, here becomes the friend of the veterinarian, and helps him out in the matter in question.

At the Veterinary School of Belgium, a series of experiments have been made to test the question whether glanders could be inoculated

in the dog. Fifteen animals were used, and in each case the disease was produced.

The method of inoculation is, says Rene, of no great importance. It is enough that some of the secretion from the diseased parts be gotten in the subcutaneous tissue of the dog. The most convenient way, however, is to take a thread soaked in the glanderous secretion, and use it as a seton.

The symptoms resulting from inoculation are as follows: For two or three days there is no sign of disturbance. Then signs of fever appear, the place of inoculation swells, fluctuation is felt, a bloody and purulent fluid exudes, the tissues break down, a spreading ulcer is formed. Other ulcers develop in various parts of the body.

An important symptom is lameness, which is produced by a swelling and inflammation of one or more joints.

A catarrh of the nose may appear, but this is not invariable.

The eyes become reddened, suffused, perhaps inflamed. Ulcers of the cornea sometimes develop. The appetite is lessened, or is lost. Emaciation progresses rapidly; a fetid diarrhœa sets in.

The duration of the disease varies between one and five or even seven weeks.

Glanders is not invariably fatal in dogs. Five out of twelve recovered, in the experience of Dr. Rene.

Others have found that glanders runs a much milder course than is above described.

The post-mortem lesions are as follows: The skin shows many ulcers and farcy buds. The lungs sometimes contain tubercles; they may also show the glanderous pneumonia found in horses.

Digestive apparatus: The liver may have tubercles. There is likely to be congestion and inflammation of the lower parts of the intestine.

The lymphatic glands are enlarged and inflamed.

Many of the joints show a suppurative arthritis.

M. Rene claims that in the inoculation of the dog we have a sure test of the presence of glanders. Veterinarians should not forget, however, that some experimenters have not been able always to inoculate the disease in this animal, until there is more corroborative experience, therefore, we must not infer too surely that if the dog does not take the disease the horse does not have it.

Glanders, it is now asserted, can be transmitted to the following animals: Sheep (Bouley and Renault), goats (Gerlach and others),

spontaneously in goats (Ercolani), bats (Christol and Kisner), lions and bears (Leisering, Lafosse, and others), mice, rabbits, Guinea pigs.

Attempts to inoculate cattle, swine, and domestic fowls have almost invariably failed.

THE HYPODERMIC USE OF MORPHINE IN THE COLIC OF HORSES.—Dr. Carl Lemke, of Bremen, has treated 1,136 cases of colic in horses with hypodermic injections of morphine. He speaks enthusiastically of his success. The morphine must be given in large doses, e. g., seven grains (gr. vii.) for a small horse, eight to ten grains (gr. viii.—gr. x.) for a large one. With these doses he has never seen any injurious effect.

Dr. Lemke acknowledges that morphine is not sufficient in colic from obstruction, but argues that it even assists (?) the action of aloes.

After an injection of morphine, the following three things may happen.

1. The patient after ten or thirty minutes feels no more pain and is well. This happens in the most of his cases.

2. The patient continues better from two to five hours. The pains then return. This shows, says Lemke, that it is a case of obstruction colic. The prognosis is always favorable. One only needs to give purgatives in powerful doses.

3. The patient after the injection shows no, or only very temporary, signs of improvement. These cases usually end fatally.

The hypodermic method helps in the diagnosis and prognosis, therefore Dr. Lemke confesses that much of his practice, though not all, has been in the military service, where he was called to see his cases early.

SLAUGHTER-HOUSE EXAMINATIONS.—In the City of Augsburg there were slaughtered during 1881, 66,731 animals for the market. Of these 12,269 were held, among whom were found 246 beeves and 3 hogs with tuberculosis. This makes a proportion of 2.01 per cent., which is much smaller than is alleged to be the case in American cattle.

The most numerous lesion was that produced by distomata (the *Egelwurmer*) in the liver. These were found in 1,061 beeves and 165 sheep.

We may add here that among 168,579 hogs slaughtered at Berlin in 1881 there were found only 128 with trichinæ. In Hamburg there were 73,113 American swine, hams and ribs examined; of these, 695 or 0.95 per cent., were trichinous. Among 55,799 European hogs and pieces there were only two found trichinous, or 0.004 per cent. We fear, however, that there was some national bias in the above comparative examinations.

THE CURE FOR HYDROPHOBIA.—Some months ago, a French physician excited much attention by reporting a case of hydrophobia in man, which was apparently cured by pilocarpin.

More recently, M. Decroix, an eminent veterinarian, has reported a series of cases of rabies occurring in men and dogs. He asserts, very positively, that the disease is sometimes spontaneously curable, both in man and other animals. He thinks that the administration of medicines does more harm than good.

Filing the teeth of dogs is recommended as a better safeguard than muzzling.

It is apparent that the pathology of rabies is still far from being settled.

LITERARY NOTES.—Professor Th. Leisering, of the Royal Veterinary School at Dresden, has published a fifth and enlarged edition of his work on the horse's foot. It contains one hundred and fifty-nine wood-cuts.

Dr. O. Eversbusch, of the Munich Veterinary School, has written a short clinical work on diseases of the eye.

Prof. Putz, of Halle, has written a book upon the epidemic and endemic diseases of our domestic animals.

Dr. P. Adam, of Zweibrucken, is publishing a series of monographs on the anatomy, physiology and diseases of the horse.

An excellent and much-needed work upon diseases of our domestic fowls has just appeared from the pen of Prof. F. A. Zurn, of Leipzig.

THE FREQUENCY OF TUBERCULOSIS IN COWS SLAUGHTERED FOR FOOD is a question of much importance to have definitely settled. In another paragraph we have referred to some facts bearing upon this point. We stated that among 12,269 cattle slaughtered in Augsburg in 1881, 246, or 2.01 per cent., were found tuberculous. Among

24,901 calves under the age of four weeks, there was found no tuberculosis at all.

The age of the tuberculous cattle was, with the exception of twenty-three, over three years.

The seat of the tubercles was in 68 cases in the lungs and pleura, in 142 cases in the lungs alone, and in 37 cases in the pleura alone; in 59 cases there were also tubercles in the liver.

Of these infected cattle the flesh of only 18 was condemned as unfit for use. During the year six of the cows thus found tuberculous had for a long time been used as milch cows for the city.

THE QUESTION WHETHER THE FLESH AND MILK OF TUBERCULOUS COWS can transmit tuberculosis when eaten by man, continues to be a burning one. It is now, however, in a fair way to be definitely settled. A commission has been appointed in Germany, with Virchow at its head, to investigate the matter. A second commission is soon to be appointed by the Paris Academy of Medicine with the same object in view. In England, Drs. Simon Burdon-Sanderson and Creighton are studying the question.

In this country, a report was made not long ago by three veterinarians of this city upon the subject of tuberculosis. The conclusions reached were very novel and radical; so much so as to excite some doubts as to the capacity of the investigators.

WE call the attention of our readers to an error at the foot of page 290. Instead of "From two to five years old" read "From four to five years old."

THE article by J. L. Wortman is taken from the advance sheets of the new edition of W. H. Clarke's work on horses' teeth.

CASE DEPARTMENT.

I.—DIFFUSE PURULENT BRONCHIECTASY IN A CALF, WITH MORBID ANATOMY NOTES.

REPORTED BY WM. OSLER, M.D., PROFESSOR AT MC GILL COLLEGE, AND A. W. CLEMENT, OF LAWRENCE, MASS., STUDENT AT THE MONTREAL VETERINARY COLLEGE.

The condition here described is stated to be infrequent in cattle, and affects old rather than young animals. It was doubtless induced by a bronchitis with copious secretions, which, lodging in the dependent tubes, caused dilatation and eventually infiltration of the walls, and extension of the inflammation to adjacent air cells. Professor Siedamgrolzky gives a plate (*Archiv. fur Thierheilkunde*, Bd. iv., Taf. iv.) exactly resembling the appearance in this instance.

A Galloway calf (female), aged six months, was admitted to the Infirmary of the Veterinary College on the morning of January 14th, 1882.

The following history was obtained: Healthy when born; it began to cough a few weeks after birth, and has ever since presented signs of chest trouble. It fed indifferently, and did not thrive. The family history is good. On examination, the animal was found to be much emaciated and very weak; coat rough and covered with lice; eyes sunken. It had a husky, frequent cough, without expectoration. Mucous membranes, congested. No response to pressure on trachea or larynx; pulse, 75 and weak; temperature, 102.6°; respiration, 38.

On percussion, a clear note was obtained except over a portion of left lung just behind the scapula, where there was perceptible dullness. On auscultation, the respiratory murmur could scarcely be detected over the portion corresponding to the area in which there was dullness. The animal was placed in a loose box and remained there until death, ten days after. The course of the disease during this period was a steady decline. The extremities and muzzle became cold; the abdomen, at times, tympanitic; the cough more violent, with slight but not fœtid expectoration.

The area of consolidation in the left lung increased, and there was slight dullness over anterior part of right lung. The respiration became hurried

and weak, and on auscultation a harsh, rasping sound was heard, most evident over left lung. The temperature ranged from 100.6° to 104°, was irregular, usually an evening exacerbation.

Autopsy.—Much emaciation. The pathological condition was confined to the lungs. The anterior lobe in left lung was airless and dark in color, except in the upper part. The posterior lobe was crepitant and of natural color. There were no pleuritic thickenings or adhesions. On the affected portion of lung could be seen, beneath the pleura, numerous opaque white spots about the size of peas, not projecting beyond the membrane, often arranged in a foliaceous manner, and presenting irregular sinuous margins. These proved on subsequent examination to be greatly dilated bronchi, with inspissated contents. The appearance was best seen in the dependent portion of the lung. On section of the affected portion it appeared riddled with small and pretty closely set cavities—dilated bronchi—containing a tolerably consistent purulent matter of an opaque white color. These bronchi, when slit up with the probe-pointed scissors, proved to be in a state of dilatation, even to their ultimate ramifications. The intervening portion of lung-substance was of a dark livid red color and collapsed. There were no solid nodules, no extensive caseous masses, no cavities. The dilated and filled bronchi constituted the only important change in the organ. On tracing the larger bronchi of this lobe there also were found to contain muco-pus in considerable quantity. The upper part of this lobe was crepitant, and had no special alteration.

In the right lung a small area about a hands breadth in the anterior lobes was in the same condition, dark, livid in color, with the bronchi filled with a semi-caseous pus. The other three lobes were crepitant, and of good color.

The bronchial glands were soft and swollen, but not cheesy.

Histology.—The material contained in bronchial tubes consisted almost exclusively of pus cells in varying degrees of fatty degeneration. Mixed with these were a few larger cells. A portion of lung, frozen, sliced and stained in carmine showed the following: Under a low power were seen numerous irregular spaces which corresponded to the dilated bronchi, partially filled with purulent matter. In many places these have compressed the intervening parenchyma. With No. 7 (Hartnack) the walls of the distended bronchi were seen to have in great part lost their histological characters. The cilliated epithelium was nowhere visible,and the tissue appeared infiltrated with round cellular elements, often so crowded as to obscure even the fibrous tissue of the wall. In some the thickening of the wall was v ry marked, and there was the appearance of a central dilated lumen with thick infiltrated margins resembling the condition of nodular peribronchitis.

In several spots giant cells were found in the wall, but they were by no means abundant.

The whole condition as regards the bronchi appeared to be distention, with purulent contents, infiltration by a small celled growth of the bronchial walls and extension of this to a variable distance.

The tissue intervening between the distended bronchi was in great part collapsed. The air cells still visible, and did not present any marked epithelial proliferation. Here and there small aggregations of cells were deeply stained and there were giant cells in several of these.

II.—CHRONIC BRONCHITIS—SPURIOUS MELANOSIS OF LUNGS IN A DOG.

An old Scotch terrier was sent to the Laboratory for experimental purposes, and was noticed to have a very severe cough, paroxysmal in character, much worse at some periods than at others. He was kept for several weeks, appeared in good health, took food fairly well, was not emaciated, and nothing especial was noticed in reference to the expectoration. The animal was finally killed for the purpose of examining his lungs, as it was expected that there might be something of interest from the chronic nature of the cough.

Autopsy.—The pathological condition was found to be confined to the lungs. The organs were crepitant throughout, and presented an unusually dark color, owing to the deposition of carbon grains in the substance. This was especially abundant immediately beneath the pleura, particularly upon the outer surface of the organ; between the fissure of the lungs the surfaces were not nearly so much pigmented.

Immediately along the sharp margins of the lobe were uniform dark lines, apparently representing the margins of larger sub-pleural lymphatics. In one or two spots this was perfectly evident; in other places the appearance of the deposit was less marked. On section of lung substance a similar pigmented condition existed, chiefly along the lines of interlobular connective tissue, but was not so evident as beneath the pleura. The mucous membrane of trachea was injected, and about the bifurcation there was distinct thickening, and the mucous membrane was rough and granular. The elastic striæ of the larger bronchi were unusually distinct; the mucosa was injected, but smooth. The tubes contained mucous. There were no parasites, no spots of consolidation of lung. The bronchial glands were carbonized, but not enlarged. On miscroscopic examination, the pigment was seen to consist, in great part, of minute irregular granules, either free in the interstices or enclosed in cells. Here and there a definite coarse particle of carbon (coal-dust) might be seen in the tissue. In thin sections, showing

the pleural surface, the pigment was seen aggregated in certain definite lines representing the margin of the lymph-vessels. These aggregations were made up of closely-packed corpuscles, impregnated with carbon, some of which also existed in the form of fine granules.

Remarks.—The animal was an old dog, and though no history could be obtained of unusual exposure to dusty or carbonizing influences, we may assume that these had existed, as the lungs were much darker than the age of the animal would account for. So far as we can ascertain, this condition is not very common among the lower animals; though, of course, those employed in mines and mining districts suffer like the miners from the inhalation of dust, etc. In this instance, the affection of the lungs was not extensive enough to be termed anthracosis. The pigmentation may not have had anything to do with the chronic bronchitis. The rough, thickened condition of the mucosa at the bifurcation of the trachea is of interest in connection with the paroxysmal charaeter of the cough, so often met with in affections of or pressure upon this part.

III—HÆMATO-PYO-METRA IN A BITCH.

The cause of the distension in this instance is not very evident. Chronic endometritis does not often lead to it unless there is some narrowing at the os or in the vagina. From the amount of blood it may have been a hæmatometra at first, with subsequent inflammation of the mucosa, and suppuration.

On May 15th a spitz bitch, weighing seven and a half pounds, was brought to the Infirmary for treatment. No history could be obtained, save that for about ten days previous she had appeared dull, was thought to be constipated, and the belly had gradually enlarged.

On May 19th she was again brought to the Infirmary, and on being asked if he thought she could be in pup, the attendant said he was sure she could not be, but stated that some three weeks previous she was observed to be in heat, and that the flow, which was very great in amount, had suddenly stopped. After unsuccessfully endeavoring to dilate the os, an exploratory puncture was made through the walls of the uterus, with the result of obtaining a dark-brown fluid; a small canula was then inserted and about twelve ounces of this fluid withdrawn; a stimulant was given and the animal sent home. She died in about two hours after the operation was performed. The fluid contained some red blood corpuscles and many leucocytes-pus cells.

Post Mortem: Vagina looks normal. The os admitted a small knitting-needle. The body cavity seemed enlarged and contained a bloody fluid. A probe could be passed along the narrow neck into either cornu. The left was greatly dilated and contained a dark bloody fluid which, on standing,

separated into a clear supernatant part, and a heavy grayish-red deposit, which was made up of pus and blood cells. The mucous membrane was rather thick, grayish in color, and presented numerous cubriform depressions and parallel ridges or elevations passing around at right angles to the axis of the cornu. The right cornu was slightly dilated; contained a similar kind of fluid. The mucous membrane presented numerous broad villous outgrowths. The ovaries were normal. The bladder and urethra normal.

MONTREAL, CANADA.

IV.—CATARRHAL PHTHISIS IN A LLAMA WITH A FIBRO-CALCAREOUS TUMOR IN THE PERINEAL REGION.

REPORTED FROM THE CENTRAL PARK ZOOLOGICAL GARDEN BY WM. A. CONKLIN, D.V.S.

The first symptoms occurred July 13th, 1882, when it was noticed that the animal in question refused food. It also maintained a sitting posture, and could not be induced to rise.

July 14th it appeared a little better, and tried to eat, but could not be induced to walk around or take any exercise.

July 15th an anæma of soap and water was used to move the bowels.

When the attendant was administering the enema, he noticed for the first time a large swelling alongside the sheath of the penis.

Upon physical examination of the tumor, it was found to be hard and quite freely movable. Manipulation of the neoplasm did not cause pain; in fact, the new growth caused no disturbance whatever.

On the morning of July 16th the animal suddenly died.

Necropsy.—The Llama was in fair condition.

Thoracic Cavity.—The heart appeared to be normal in every respect. The lungs, however, showed marked evidence of a phthisical process in the superior lobes. The inferior lobes were deeply congested and œdematous. The tumor, which lay alongside the sheath, had no connection with the penis, but seemed to lie between it and the muscles of the thigh.

The growth was nearly circular in outline and quite hard, as if bony. It was ten centimetres, or four inches, in diameter. The minute structure of the growth was fibrous, with a shell of calcareous matter. A fibrous tumor, with a crust of calcareous matter. In all probability this new growth had nothing to do with the cause of death.

The cause of death, I think, might more accurately be ascribed to the phthisical process, associated with a sudden congestion and œdema of the lungs, causing a paralysis of the heart.

NEW YORK CITY, July, 1882.

V.—GRANDO OR CHALAZION IN AN EAGLE.

REPORTED FROM THE CENTRAL PARK ZOOLOGICAL GARDEN, BY WM. A CONKLIN, D.V.S.

The history of this case is unfortunately quite brief. The principal thing was the development of a large tumor and a small secondary tumor over the eye, which partially closed the opening of the eyelid. It also crowded the eye downward and outward.

The larger of the two tumors was about 2.5 centimetres or (one inch) in diameter, the smaller about one-third that size.

Upon microscopical examination the growth was found to have an incomplete capsule, within which there was a series of concentric laminæ. These laminæ, when examined with a high-power lens, were found to be composed of a few filaments of incompletely formed fibrillated elements, but mostly of a granular debris.

[This is the first case of the kind that we have met with, but Dr Conklin informs us that this trouble is quite common among eagles, and has caused considerable trouble in the Philadelphia Zoological Garden.

If our diagnosis is substantiated by more cases, it seems reasonable to suppose that an early operation would ca se a disappearance of the tumor and a permanent cure.

The growths are undoubtedly in or near the under surface of the tiarsal cartliges primarily. By everting the eyelid, making an incision into the sac of the tumor and turning out its contents, it seems reasonable to suppose that when practiced early in their development, a permanent cure might be effected.—Ed].

VI.—DEGENERATING HÆMATOMA IN AN IGUANA.

REPORTED FROM THE CENTRAL PARK ZOOLOGICAL GARDEN, BY WM. A. CONKLIN. D.V.S.

This Iguana had a large swelling on the side for some two months before death. Shortly after the swelling appeared I lanced it, but very little blood or matter flowed from the incision. Up to this time, and after, the animal ate quite well until two days before death. During this time the animal appeared quite well and healthy.

This animal was kept in a cage with some African pythons, and it occurred to me that these snakes in crawling around the cage may have given it a squeeze and thus caused the development of the tumor.

Examination of the Tumor.—There was a small tumor lying in the muscles of the left flank. When the tumor was carefully microscopically

examined, it was found to be composed principally of granular debris and a few fibres of finely fibrillative connctive tissue substance. It did not present any of the characters of a sarcoma or carcinoma, but more like the degenerating contents of a hæmatoma.

NEW YORK CITY, August, 1882.

VII.—CARIES OF A MOLAR TOOTH OF THE SUPERIOR MAXILLA WITH NECROSIS OF THE JAW.

REPORTED BY FRANK V. WALTON, D.V.S.

Case, a young gelding, æt. 6. Was bought January 6th, 1882. At the time of purchasing a slight swelling was noticed upon the left superior maxillary bone. At the centre of this swelling there was a slight brake in the skin, with a small discharge of pus. The purchaser took this to be a bruise, with slight suppuration, probably, from an injury caused by transportation in the cars.

After getting the horse to his stable it was noticed that the tumor rapidly enlarged, the discharge became more profuse, and had a very offensive odor.

At the first examination a probe easily passed from the external opening through the alveolar process of the upper jaw, and on into the mouth. At this time a few small fragments of necrosed bone were detected.

A diagnosis of necrosis of the jaw with ulceration of one of the teeth was made. A removal of the affected tooth and the necrosed bone was advised, which was wisely consented to by the owners.

An attempt was made to remove the tooth with the dental forceps commonly used in veterinary practice. It was found to be an impossibility to draw the tooth with the power afforded by such an instrument. It was ascertained that the crown of the tooth could be easily crushed off by the instrument; but this would not reach the original difficulty. All attempts in this line were then abandoned.

The following day the horse was thrown, secured, and ether administered. A crucial incision was made by Prof. Porter over the most prominent portion of the enlargement, the four flaps turned back, and the teeth and superior maxilla fully exposed. Having accomplished this, the external alveolar process was chiselled away, exposing the root of the tooth for its whole length. The necrosed bone was also removed. It was now quite an easy matter to pry out the affected tooth. There was quite a profuse capillary hemorrhage for a few minutes; this, however, soon stopped upon the application of ice-cold water.

The horse quickly rose to his feet and seemed to be greatly relieved.

The external half of the incisions was closed with sutures, but the centre was left open so that the wound could be more easily cleansed.

The wound was thoroughly washed with a carbolic acid solution, and then injected with a solution of copper sulphate, ten grains to one ounce of water.

The animal made a speedy recovery, took to his feed well the next day, and in two weeks was at work and feeling quite well. The external opening was not allowed to close for some time, so that in case there were any small fragments of necrosed bone to come away, they could be more easily manipulated.

One remarkable feature in this case was the fact that there was no offensive odor from the wound, and the horse took to his feed the next day, and rapidly gained in general health and spirits.

Microscopical examination showed that there was nothing malignant in this trouble.

NEW YORK CITY, August, 1882.

[This case shows the efficacy of copper solutions in the treatment of cavious and necrosed bone.

This case ought to be one of great interest to the veterinary surgeon, for tumors of the superior maxilla are not infrequent, and many of them prove to be quite malignant in character.

This, in connection with similar cases, goes to show that it is reasonable to suppose that many of them commence in this simple manner. Caries of the root of the tooth and slight necrosis, which, if not speedily removed, acts as a constant irritant, often working its way into the maxillary sinous, and in the long run producing a malignant and incurable disease.

The ease with which the operation was performed and the rapid and complete recovery of the case are strong arguments in favor of such operations being done early and completely.

In most of these cases we think it would be much better, instead of making a crucial incision, to slit up the lip toward the ear and turn up the upper lip. In this way the jaw could be quite as easily reached, and there would be the least possible deformity after recovery.—ED.]

VIII.—INVERSION OF THE UTERUS.

REPORTED BY DRS. FRANK V. WALTON AND EDWARD A. MACLELLAN.

Was first called to see the cow at eight o'clock P. M. At this time was informed that the animal had thrown a calf at eight o'clock A. M., which was followed by a speedy inversion and protrusion of the uterus.*

Between eight in the morning and eight in the evening, repeated attempts had been made to reduce the organ, but each proved futile. The uterine body had been laid in a tub of ice water, which had partially

controlled the hemorrhage, but the walls of the organ were made quite thick and hard by this process.

When first called in the evening the uterus was cold, hard and quite black, as if about to become gangrenous.

The haunches were raised some two feet from the floor by thick bundles of straw. The projecting uterine body was then washed with warm water containing a small quantity of carbolic acid a solution about 1 to 60. This was kept up for about one-half hour. It caused quite a free hemorrhage from the mucuous surface, the walls of the uterus, however, became gradually warmer, softer and more flexible. Dr. MacLellan then grasped the mass in his hands as well as could be done, and by constant pressure and some kneading, at the end of half an hour, the organ was with great difficulty forced back into its place.

Numerous attempts were made by the cow to expel it, and it was with great difficulty kept in position until a permanent support was applied.

A graduated compress was applied over the vagina and perineal region and held in position by a tea bandage. Just before applying the compress and bandage the uterine cavity was washed out with warm water containing alum and opium, five ounces each to the pint.

The animal was given six ounces of brandy and one ounce of tr. opie per orem. She was now left in charge of the stableman until the next morning.

When seen in the morning, she was found standing and eating at the manger as usual, but it was noticed that she was quite weak. During that day she made a few weak efforts to expel the uterus.

The uterus was again washed out with a weak alum and carbolic acid solution, and the compress again applied.

On the third day, the discharge from the vagina had an offensive odor and contained numerous cheesy flakes.

The compress was now removed for good, as there was no indication of any attempt to further expel the uterus. The cavity of the uterus was then thoroughly washed out with a warm solution of alum and carbolic acid, and left without any support.

On the fifth day after the replacement all discharge had ceased, and the animal was perfectly recovered.

NEW YORK CITY, June, 1882.

[This case is quite interesting, as it shows that the uterus can be returned even after being down for some time, if time and patience are brought to bear upon the case. But with all this, it is no easy matter to return the organ; but if returned, the animal is far more valuable than one in which the protruding mass has been amputated. This is especially so if the animal be a valuable breeder. Long and persistent efforts should be made to restore the organ before attempting an amputation.—ED.]

PROCEEDINGS OF SOCIETIES.

PATHOLOGICAL SOCIETY OF PHILADELPHIA, MAY 25, 1882.

CANCER OF MAMMARY GLAND OF DOG, WITH METASTASIS TO LIVER AND LYMPHATIC GLANDS. EXHIBITED BY DR. H. F. FORMAD.

An old female rat-dog about two years ago showed a circumscribed induration in one of the mammary glands of the size of a walnut. This subsequently proved to be a permanent tumor, increasing very slowly in size, and causing the animal to suffer pain at times intense. One year ago, when I saw it first, the tumor was of the size of a hen's egg, and painful on pressure. There was also involvement of the axillary glands, which were large and nodulated. I did not see the dog again untii a year later, when it died and was kindly sent to me by Dr. Keys.

Antopsy.—The animal was greatly emaciated. The mammary tumor had reached the size of a large orange, was encapsulated, round and flat in shape, hard, skin movable over tumor. All over the abdomen and chest there were seen about twenty secondary tumor-nodes, varying in size from a pea to a hazel-nut. The axillary glands were nodular and greatly enlarged through infiltration by the new growths. Several secondary nodes of the growths were found in the liver. There was also a remarkable enlargement of the thyroid gland, on section proving an eneurismal goitre. Microscopic examination of themammary tumor and of the secondary deposits showed scirrhous cancer.

Dr. S. W. Gross remarked that if this growth was truly carcinomatous it certainly did not resemble the same neoplasm in man, as it was clearly circumscribed by a distinct capsule.

Dr. Tyson was a little doubtful whether it could be really carcinoma, even with the microscopic appearances described, since microscopically the growth differed entirely from human carcinoma, as it did not infiltrate the surrounding tissues.—*Philadelphia Medical Times.*

OBITUARY.

NOTICE has been received of the death of DR. ERNST FRIEDERICH GURLT, who died at Berlin on August 13th, in the eighty-eighth year of his age.

Dr. Gurlt obtained his medical degree at Breslau, where he served under the celebrated Otto as anatomical prosector. "De Venarum Deformitatibus" was the subject of his dissertation for the degree. He joined the Berlin Veterinary School in 1825, and taught there for many years. During his long professional career, he labored earnestly in promoting Medical and Veterinary Science. Success crowned his efforts, his services having been recognized not only in Germany but in other countries. The most important among his numerous writings is the "Handbuch der Vergleichenden Anatomie der Haus-Säugethiere," the fine "Hand-Atlas der Anatomie des Pferdes," in folio; the "Lehrbuch der Vergleichenden Physiologie der Haussäugethiere"; the "Anatomie der Hausvögel;" the "Lehrbuch der Pathologische Anatomie," and "Ueber Thierische Missgeburten," the last part of which appeared as late as 1877. He edited, in conjunction with Hertwig, the *Magasin für Thierheilkunde*, the leading professional journal in Germany, from it commencement; and to it he contributed many papers of the highest interest and importance. Gurlt's name will ever be honorably associated with the development of veterinary science in Europe, while it will enhance the reputation of a school which has been prolific in training the greatest masters of this science.

R. P. LORD, M.R.C.V.S., who graduated in 1873, did recently in Baltimore.

E. P. BOWMAN, V.S., aged 63, died of apoplexy, in Lynn, Mass. He studied under Dr. George H. Dadd, and was a very energetic and worthy member of the profession.

D. C. RILEY, V.S., aged 75, was fatally injured by a railroad train at Long Branch. He was a graduate of Dublin University.

REVIEWS.

Report of the Treasury Cattle Commission on the Lung Plague of Cattle, or Contagious Pleuro Pneumonia. Pp. 138, 8vo. Washington: 1882.

This Report is an ably-written document, and does full justice to the important subject which it treats. Adopting by preference the term Lung Plague for the disease as indicating its specific character, the author gives a concise history of it from the time of Aristotle to the present day. It tells how the infection, at first confined to Central and Western Europe, slowly travelled eastward and southward, soon reaching the British Isles, and finally, our country, through the port of New York, from which point it travelled only southward, owing to the opposing current of cattle traffic; and how it found its way into Massachusetts by direct importation, but was immediately stamped out—thanks to the prompt and efficient action of the authorities. It is proved, also, that it arises and spreads invariably by direct contagion, and is peculiar to the bovine genus; shows the inefficacy of inoculation, its great expense, and the impossibility or making it universal, advising the better method of extinction; shows how faulty the present system of quarantine is, and suggests an improved one.

We are glad to know that the Treasury Department has recognized the importance of the subject of Professor Law's Report and is about to establish quarantine stations for imported cattle at New York and other seaports, under the authority of an appropriation of $50,000 by Congress. But we sincerely hope that the department will not stop here, but promptly follow it up by undertaking and putting in execution the plan of extinction or "stamping out" as the most efficient and, in the end, the most economical one of thoroughly exterminating this terrible disease from the country.

BOOKS AND PAMPHLETS RECEIVED.

The Antiseptic Treatment of Wounds. By W. T. Briggs, M.D. Reprint from *Nashville Journal of Medicine and Surgery.*

The Treatment of Subacute and Chronic Gout. By Alexander Hadden, M.D. New York City: 8vo, pp. 20.

Studies from the Biological Laboratory of Johns Hopkins University. Baltimore: Vol. II, No. 3.

ANNALES ET BULLETIN DE LA SOCIÉTE DE MEDICINE DE GAND.

JAHRESBERICAT DER KONIGLICHEN THIERARZNEISCHULE ZU HANNOVER. Herausgegeben von dem Lehrer—Collegium redigirt von dem Director Dr. Dammann. Vierzehnter Bericht, 1880–82.

MONTREAL VETERINARY COLLEGE. Sixteenth Annual Announcement, Session 1882–83.

KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY. Edited by Theodore S. Case. Monthly.

JOHNS HOPKINS UNIVERSITY CIRCULARS. No. 17. August, 1882.

THE VETERINARY JOURNAL. London.

DER ZOOLOGISCHE GARTEN. Frankfurt.

WOCHENSCHRIFT FUR THIERHEILKUNDE UND VIEHZUCHT. Augsburg.

SCHWEIZERISCHES ARCHIV FUR THIERHEILKUNDE UND THIERZUCHT. Bern.

REPERTORIUM DER THIERHEILKUNDE. Stuttgart.

ARCHIV FUR WISSENSCHAFTLICHE UND PRACTISCHE THIERHEILKUNDE. Berlin.

LA PRESSE MEDICALE. Paris.

THE CHICAGO MEDICAL JOURNAL AND EXAMINER. Chicago.

THE MEDICAL RECORD. New York.

THE COLLEGE AND CLINICAL RECORD. Philadelphia.

ANNALS OF ANATOMY AND SURGERY. Brooklyn.

NEW ENGLAND MEDICAL MONTHLY. Newton, Conn.

CHICAGO MEDICAL REVIEW. Chicago.

ST. LOUIS CLINICAL RECORD. St. Louis.

VIRGINIA MEDICAL MONTHLY. Richmond.

NASHVILLE JOURNAL OF MEDICINE AND SURGERY. Nashville.

THE BLACKSMITH AND WHEELWRIGHT. New York.

NATIONAL LIVE STOCK JOURNAL. Chicago.

THE BREEDER'S GAZETTE. Chicago.

THE CULTIVATOR AND COUNTRY GENTLEMAN. Albany.

INDIANA FARMER. Indianapolis.

MIRROR AND FARMER. Manchester, N. H

TRUTH. San Francisco.

THE WEEKLY DROVER'S JOURNAL. Chicago

PROGRESS OF VETERINARY SCIENCE.

An English slaughterman makes the statement that but few calves have perfectly healthy livers, "not one in ten," most of them containing larger or smaller collections of putrid "matter."

CAMEL'S LUNG WITH FILARIÆ SANGUINIS.—Mr. Eve exhibited before the London Pathological Society, April 18th, a specimen which showed adult filariæ sanguinis in the lung of a camel. The animal had suffered from a wasting disease for a year, and every drop of blood was found to contain ten or twelve embryo filariæ. The camel was killed by decapitation, and on examination adult filariæ were found in tangled masses within the aorta and the pulmonary artery and branches. Dr. Lewis, to whom the specimens had been sent, said that though the embryo was like that of the filaria sanguinis hominis, the adult was much larger, and evidently of a different species.

A BLOOD DIET FOR THE HERBIVORA.—The fact that all animals, even the herbivora, are at first nourished on a diet of milk, which must be considered as purely animal, led M. Regnard to suggest that an animal diet might be employed to advantage at a subsequent epoch in their history. The idea is not new, but attempts to verify it by, for instance, feeding horses on meat, raw or cooked, invariably failed in consequence of the disgust which this diet occasioned. It occurred, however, to M. Regnard that an animal substance might be utilized—certainly highly nutritious, of which tons are wasted weekly—viz., blood. The problem was how to present it to the animal in such a form as not to occasion disgust. The blood was heated to 100°C., and the coagulum thus obtained was pressed and rapidly dried in a stove, and then powdered in a coffee mill. It was found to keep well, and to be destitute of odor and of taste, and was given mixed with other food in doses varying from ten to eighty grammes daily. The experiments were made on lambs which had been abandoned by their mothers. Three lambs were kept on the ordinary diet of beetroot, hay, etc., and to three others the powdered blood was given. The first steadily lost flesh, while the latter increased to three times the original weight, and connoisseurs declared that they had never seen such fine lambs of the same age. The animals surpassed their fellows which had been suckled by their dams both in weight and size, and their coat of wool was doubled in thickness. Experiments of the same kind are now in progress with calves, and promise to be as successful as the

others. It will certainly be a matter of high importance if the vast amount of nutriment now almost entirely wasted can be thus utilized. The saving of milk in rearing calves, for instance, would alone be a most valuable item. It appears that this system of alimentation is applicable also to man. In the case of a rickety child of eighteen months the results are said to have been most encouraging.

The Salmon Disease and its Lessons.—Professor Huxley has published some observations on the epidemic known as the Salmon Disease in the proceedings of the Royal Society. The disease, as is well-known, is produced by the growth of a parasitic fungus, and Professor Huxley looks upon it as a disease of the same order as ringworm in the human subject, as the muscardine of silkworms, and the potato-disease. This fungus, which belongs to the order *Saprolegnia*, finds a suitable nidus in the skin of that part of the body which is devoid of scales, and generally first attacks the top and sides of the head; thence it may extend widely over the scaly surface also, and deeply into the true skin, causing extensive ulceration and sloughing, so that "one vast open sore may cover the top of the head from the snout to the nape, and may extend over the gill-covers." Several points of general interest have come out in the course of the inquiry; one of these is, that the fungus does not attack the viscera, so that the flesh of the diseased fish is probably not injurious in any way; and it has been said, by those who have made the experiment, that the palate can detect no difference between it and the flesh of a healthy fish. This applies probably only to the early stage; for when death—which is produced by exhaustion—is approaching, the flesh no doubt deteriorates in quality. Another interesting point is the manner in which the sloughing of the true skin is produced. The fungus at first attacks the cuticle, but, after it has taken root there, it sends processes (hyphæ) downwards into the true derma; these processes branch laterally in every direction, and gradually extend deeper and deeper. The tracks of these hyphæ are not accompanied by any obvious inflammation; but they are so closely set that they mechanically interfere with the nutrition of the part, and so lead to sloughing. The third point to which we wish to draw attention is, that the fungus is essentially a saprophyte—*i.e.*, it ordinarily finds its nidus in dead animals or vegetable tissues, and is only occasionally a parasite upon living organisms. Every stream in the kingdom probably contains indefinite quantities of this and allied fungi, whieh grows readily on the bodies of dead flies and other insects. Professor Huxley thus arrives at a conclusion with regard to this disease analagous to that to which the student of human pathology is often brought in the case of many infectious diseases—namely, that though the parasitic organism may be the determining cause of the train of symptoms which come under observation, there are other, and as yet unknown, circumstances, extrinsic or intrinsic to the infected animal, in the absence of which the parasite cannot develop.

NEWS AND MISCELLANY

NOAH CRESSY, M.D., V.S., PH.D., has taken the editorship of the Hygienic and Veterinary Department of the *National Live Stock Journal.*

FEEDING HORSES.—It is not good policy to let work horses get thin. It costs more to put on flesh than it does to keep it on. Flesh that becomes hardened by exercise will be kept up with less food, under the same work, than it took to put it on. From fifteen to thirty pounds of food will about supply the daily consumption of horses, large and small.

The English cavalry horses are fed ten quarts of oats and twelve pounds of hay three times a day. The American cavalry horses have had the English rations increased to thirteen or fourteen quarts of oats and an equal amount of hay three times a day. The hunter, in the season, is allowed from sixteen to eighteen quarts of oats and about eight pounds of hay, fed five times a day. The race horse is allowed from eighteen to twenty quarts of oats per day, and nearly as much hay as the hunter, being usually fed five times a day.—*National Live Stock Journal.*

THE PULSE of the different domestic animals:

Species.	Mean Number of Pulsations per Minute.		
	Adultism.	Youth.	Old Age.
Horse,	From 36 to 40	From 60 to 70	From 32 to 38
Ass and Mule,	" 46 to 50	" 65 to 70	" 55 to 60
Ox,	" 45 to 50	" 60 to 70	" 40 to 50
Sheep and Goat,	" 70 to 80	" 85 to 95	" 55 to 60
Pig,	" 70 to 80	" 100 to 110	" 55 to 60
Dog,	" 90 to 100	" 110 to 120	" 60 to 70
Cat,	" 120 to 140	" 120 to 140	" 100 to 120

—*National Live Stock Journal.*

THE cow population of the United States is 12,611,148, or about one cow to every four people. This only includes milch cows, and their value is estimated at $340,500,996, an average of $27 per head, based upon their prices in different States. There are comparatively but few cows in the South,

Louisiana, for instance, reporting but 115,000, while Iowa, with about the same population, reports 845,000. The principal dairy States report as follows:

	Number.	Value.
New York,	1,474,700	$46,349,821
Pennsylvania,	844,800	27,248,025
Ohio,	693,000	21,739,410
Michigan,	421,100	12,763,541
Indiana,	439,100	11,710,797
Illinois,	716,400	19,701,000
Wisconsin,	448,700	12,388,607
Minnesota,	344,600	8,432,362
Iowa,	845,100	22,237,700
Missouri,	547,700	10,294,000
Kansas,	409,800	10,098,876
Nebraska.	188,600	5,594,762
California,	487,600	16,051,792

Natural History and "Education."—The following story is narrated by a correspondent in the *Students' Journal:* An English physician had recommended a patient to take plenty of horse exercise, so the gentleman went to a dealer's and looked at a horse, with the intention of purchasing it. He came back to the doctor with the following report: "I went," he said, "to the horse-dealer's and saw a horse; he looked a very nice, steady animal, and I was going to buy him, but remembering it was a proper thing to look into a horse's mouth—but why I could not recollect—I put on my spectacles and examined his mouth. I was then delighted that I had not completed the purchase, for I found that the poor suffering creature had lost nearly all his teeth; the only ones left that I could see being six on the top and six in the bottom jaw; and then came two great gaps without any teeth at all. I told the horse-dealer it was cruel to keep a poor animal like that without any teeth. The dealer assured me the animal had several more teeth in his jaws farther back, and I might put my hand in and try if I liked. I indignantly refused, however, to be taken in in this manner." Evidently in some "educated circles" the advance in natural history is quite astonishing.

Veterinary Honors.—It gives us much pleasure to learn that our distinguished colleague, M. Zundel, of Strasbourg, was in June last elected a corresponding member of the Belgian Academy of Medicine. Professor Bouley, inspector of the French Veterinary Schools, has been elected president of the Acclimatization Society of France. The Paris Academy of Medicine has awarded the Barbier prize of 6,000 francs (£250) to Professor Toussaint, for his researches in anthrax, fowl cholera, and experimental acute septicæmia. At the graduation ceremony of the Edinburgh University, held on August 1st, Mr. J. McFadyean, professor of anatomy in the Dick Veterinary College, received the degree of Bachelor of Medicine and Master in Surgery. At the distribution of prizes and conferring of degrees in the Toronto University on June 8th, in the Faculty of Medicine, the University silver medal was bestowed on J. T. Duncan, Professor of the Ontario Veterinary College.—*Veterinary Journal.*

The record of casualties in the conveyance of live stock by sea, taken from the returns furnished to the Privy Council by the Inspectors of the

ports where American and Canadian cattle are landed, presents a doleful picture of the sufferings of these unfortunate dumb passengers. It appears that in last year alone 8,721 animals were thrown overboard, and 498 were landed dead, while 472 were so much injured and exhausted that they were killed at the place of landing. This makes a total of 9,221 animals which, in the space of twelve months, were either lost or seriously injured in the passage across the Atlantic.—*Drovers' Jonrnal.*

VETERINARY DEPARTMENT AT HARVARD.—On the 28th day of September a veterinary department will be opened in Harvard University, and the regular course of the veterinary students will be three years. The subsidiary branches to be studied by the veterinary aspirant are taught in the other departments of the university, while ample preparations will be made for the theoretical and practical instruction in the veterinary art. The addition of this new department will be specially welcome to the many patrons of veterinary surgery, and will give much satisfaction also to the friends of the university, who will watch with pleasure its constant progress.

UNKNOWN DISEASE AMONG CATTLE.—The failure of Congress to pass a measure to prevent the spread of contagious diseases among cattle is likely to be brought prominently into notice by the ravages of a strange disease which has recently made its appearance among stock in several States. In Pennsylvania, in the neighborhood of Reading, the disease appeared, and spread with alarming rapidity in two townships, in spite of a rigid quarantine. The Agricultural Department received information during the past few weeks of the breaking out of a similar plague among the cattle in the States of Alabama, North Carolina, Virginia, and near Wheeling, West Virginia. It is believed at the Department that the disease is what is known as Texas fever, or splenic fever, the stock dying from apoplexy of the spleen. Dr. Salmon, one of the Department inspectors, who has been in Virginia, near Abingdon, where the disease appeared, has been sent to West Virginia, declares it to be a virulent form of splenic fever. Mr. LeFevre, of Ohio, who has labored in two Congresses to secure the passage of the Pleuro-pneumonia and Contagious Diseases Bill, said that had the bill become a law, its value would be shown now, as it provided for a commission of experts whose duty it would have been to go wherever the disease appeared and take summary measures for its suppression or confinement within limits. The House passed the bill four months ago, but it failed to pass in the Senate.

The bill referred to above, which failed to pass the Senate, provided for the creation of a bureau whose chief shall be a competent veterinary surgeon, and whose duty it shall be to investigate and report upon the number, value. and condition of the domestic animals of the United States, their protection and use, and also inquire into and report the causes of contagious and communicable diseases among them, and to collect such information on these subjects as shall be valuable to the agricultural and commercial interests of the country. The Commissioner of Agriculture is also authorized to employ two commissioners, one of whom shall be a practical stock-raiser and one an experienced business man, familiar with questions pertaining to commercial transactions in live stock, whose duty it shall be to advise with regard to the best methods of treating, transporting, and caring for animals, and of providing against the spread of said diseases. The compensation of the commissioners is to be ten dollars a day, with all necessary travelling expenses, while engaged in the performance of their duty. The salary of the chief of

the bureau is to be three thousand dollars per annum; and the Commissioner of Agriculture is to appoint a clerk for the bureau, with a salary of eighteen hundred dollars per annum. The Commissioner of Agriculture is directed to make inquiry through the chief of the Bureau of Animal Industry as to the existence of pleuro-pneumonia or any contagious or communicable disease along the dividing line between the United States and foreign countries, and along the lines of transportation from all parts of the United States to ports from which live stock are exported, and to make a report of the results of such investigation to the Secretary of the Treasury. He shall establish such regulations concerning the exportation and transportation of live stock as the results of the investigation may require.

THE CATTLE QUARANTINE.— The Canadian quarantine of Quebec has been visited and its practical workings carefully studied by the commission. Sites have been selected for quarantines at Portland, Boston, New York, Philadelphia and Baltimore, subject to the approval of the Secretary of the Treasury, and accommodations for importers at these points will speedily be provided at government expense. The commission will,as soon as possible, prepare regulations for the government of these quarantine stations, and the Secretary of the Treasury and the collectors of the ports abovementioned will be relieved from what has been for the past two years a constant source of annoyance to them on account of the attempt to enforce a quarantine without any provisions for the preparation of suitable quarters for the animals to be quarantined.—*Breeders' Gazette.*

A HORSE WITH A GRIEVANCE.—The history of a cart-horse foaled in 1880 may be said to constitute a grievance that should be somehow redressed. It is not easy for a breeder to rear the best year-old agricultural stallion, and when he does so, it is very hard for his exhibit to be disqualified from carrying off prizes unless the cause of disqualification is, beyond all controversy, palpable and decided. The case to which I would draw attention is the first prize agricultural stallion, foaled in 1880, which in class 3 at the late Royal Show at Reading was awarded chief honors. It is named Certainty, and is the property of the Hon. E. K. Coke, who should know something of a good horse. Now, the history of this horse demands that the conditions at all first-class shows should be established on a general standard of excellence and soundness, and it may be submitted that, in special cases, final judgment as to soundness should be reserved. Doubtless any power of appeal would be attended with inconvenience; but even inconvenience had better be suffered than injustice.

Now, in the matter of the exhibition of the above horse at the Cart Horse Show (where it was entered under the name of Reality), the breeder had sold him to the exhibitor for a certain sum, but in the pride and confidence of his heart in the goodness and soundness of the animal, he had stipulated that he, the breeder, was to receive the value of any prizes which the colt (that had already won several) might gain at the Cart Horse Show. This was a part of the sale bargain. Professor Pritchard a short time previously to exhibition has passed Reality as sound, and when he appeared at Islington the Lincolnshire horse won the undisputed good opinion of the judges, and also it may be said of the critical public. However, on being submitted to veterinary inspection, Reality's pride of place was lost, the animal being pronounced unsound from spavin. Here was a great disappointment and surprise to breeder and exhibitor; but there was no appeal from the

verdict. So little weight, however, had this decision at the auction, that bids ran up to £250, at which high figure for a colt he was bought in, a fact showing the strong confidence of the owner.

Subsequently, a few days later, the Hon. Mr. Coke (after having had the animal examined by an eminent veterinary surgeon, who found him sound) bought him and to get rid of the ill-luck that had attached to "Reality" re-christened him "Certainty," entered him for exhibition at the Royal with the results already mentioned. In fact, admiration has followed this young cart stallion wherever he has been exhibited, but the breeder has not got rid of his grievance, nor can the public consent to a horse being pronounced unsound from spavin at one show, and being acknowledged sound shortly after by the Royal authorities. Is spavin a disease to be cured between the dates of the Cart Horse Show and Reading? Would not an animal unsound at one be unsound at the other show? Can veterinary doctors disagree over a case of spavin? Is the old common belief of farriers and horse dealers that spavin cannot be cured without leaving blemish and without taking up a long time, to be given up? or is it not possible that in this case, had there been a reserve appeal, some error of judgment would have been revealed, and the stigma of unsoundness removed? A bad name to a dog hangs him; and a verdict of unsoundness sticks to a horse, and, if untrue, does injustice to breeder and owner Young horses often have enlarged hocks, which fine down as they grow older; and the large cushion-bones of coarse hocks are scarcely a disadvantage to horses of the cart breed. Captain Hayes, in his "Notes for Horse Owners," says, quoting the high authority of Percivall, "Nothing is more common than to meet with horses, colts even, who have what the dealers call 'knots' in their spavin places; and the time was when such 'knots,' which have always been regarded as spavins, were certificated as constituting unsoundness. This was professional decision which met with a good deal of opposition at the time, and justly so, and the result has been that such 'knots' are now allowed to pass as compatible with soundness." In bone spavin there is a deposition of bone, as the result of inflammation, on the inner and lower part of the hock, and its position high or low down makes the spavin either serious or almost unimportant. In occult spavin no external evidence of disease can be observed, although lameness of an inveterate form may result from the ulceration of the surfaces of the bones which form the joints. Whether bone or occult spavin, it is inflammation that constitutes the disease, and by the cessation of inflammation the reparative process begins. Hereditary predisposition is well marked in spavin, and thus to ticket a stallion with spavin-unsoundness greatly reduces his value for breeding purposes. Major General Sir F. Fitzwygram, Bart. (in his work "Horses and Stables") has a lucid and valuable chapter on spavin and its treatment, writes squarely, "Spavins cannot be removed when once fully formed; absorption of the deposit may, to a certain degree, be assisted by the application of mild blisters, or iodine, or setons, but, when consolidated, the bony deposit will not yield to any treatment." That errors of judgement may occur, the following passage shows: "No enlargement can safely be said to be spavin, until, by manipulations, it has been ascertained to be bone. Without such manipulation, other enlargements, such as a distended vein, or a thickening of integuments, resulting from a blow, may be mistaken for spavin."

In conclusion, it seems to me that Certainty is a "horse with a grievance," and breeders, exhibitors and the public should know the reason why he was unsound at Islington, and sound at Reading.—*London Field.*

Bovine Post-Mortem.—From the *British Medical Journal* we learn that it has become customary in Bengal for cattle to be poisoned on account of real or imaginary affronts. At the suggestion of the surgeon general all surgeons hereafter will superintend the evisceration of the animal, a butcher doing the work. Tableaux—big umbrella, surgeon under it, coolies to fan him, butcher at work over a half or wholly putrid cow, thermometer 120 degrees in the shade. Truly, the life of a medical man in Lower Bengal has not fallen upon pleasant places.

Ought Diseased Meat to be Used as Human Food?—A medical officer of health writes the following to the *Lancet*: "I wish, through the medium of your columns, to ask the opinion of medical officers of health on the following case:

"A cow, which had been previously ailing, gives birth to a calf, and on the following day it is slaughtered, the meat dressed and brought into market. I am consulted as to the flesh being fit for human consumption, and finding on examination that it is soft and flabby and dark in color, with an alkaline reaction to litmus paper, and taking into consideration that the cow had been under veterinary treatment for several days, had been killed so soon after parturition, and had had physic administered to it, I condemned the meat. Acting on my advice, the Board of Health instituted an action against the butcher, and the case is heard before the local magistrates, who, after a lengthy trial, find the meat not unfit for human food.

"Was I justified in condemning the meat? The magistrates by their verdict say I was not, but, as this may be made a test case, I should like the opinion of any of my medical brethren who may feel interested in the matter, and who may feel qualified to speak on the subject. I should perhaps mention that a practitioner from a neighboring town gave evidence on the opposite side, and gave it strongly as his opinion that such meat should not be condemned. He had not seen the meat. I should like to know, seeing that all authorities on the subject were entirely disregarded, what are the circumstances under which meat ought to be condemned and destroyed as unfit for human food."

[It is impossible from the data above given for us to say whether the meat was fit for food. We may say, however, that it is not the best way for inspectors to say that meat is either fit or entirely unfit for consumption. The plan recommended by German and other experience is to divide the meat into different grades, either three or four, the first being perfectly good, the last perfectly bad.—Ed.]

Arab Horses.—Of the eleven Arab horses comprising the Crabbet Stud, recently sold, six only appear to have been purchased to remain in England; two of them go to the Colonies, two to the Continent, and one, the entire horse Pharaoh, to Hungary, his price being £525. It is to be regretted that so fine an animal, with his rare pedigree, was not retained in England. The stamina of the English racehorse is open to some reproach, seeing that there are so few that can at full speed compass a distance much exceeding two miles. If the same rule holds good with the English thoroughbred as it does with sheep—which is, that it is necessary at certain intervals of time to take a dip into the blood of the pure, unmixed, original breed, in order that the main character of the animal shall be maintained in some specific shape or other—then should a fresh infusion of the blood of the Arab, with his undoubted stamina, be again blended with our English racehorse.

No animal existing has a history so interesting as the horse, whether in ancient or modern times. The books of Genesis, Exodus, Kings, and Job contain passages descriptive and poetical, showing that he had been long under the control of man. Solomon, who had a stud of 40,000 horses, used to recruit his numbers from Egypt, and the price is given as 150 shekels, or £20. The East, no doubt, can claim the horse as its original home, and although he differs in form and size in different countries, it is from the influences of climate and cultivation, running through thousands of years, that the drayhorse, the Shetland pony, and the racehorse all had one common origin. Friezes of ancient temples, carving on Egyptian monuments, and Greek sculptures in the British Museum all depict the horse as we now see him in the Arab. From the days of Solomon to Mahomet, on to the Mamelukes, who were created from slaves in the twelfth century, and made into cavalry to resist the inroads of Genghu Khan and the deeds of Saladin, the Arab horse was a great factor in all these gigantic expeditions. The Mamelukes, who protected Egypt and Arabia for six hundred years, met with a great disaster from Napoleon in 1789 under the pyramids; and in 1811 they were finally crushed out by Mehemet Ali.

A superior class of Barb horses were rescued from the remains of the Spanish Armada, with which the heavy English-bred mixed with great success, as in James's reign horse racing assumed a more prominent feature at Croydon and Newmarket. James gave silver bells as a trophy to the winners; but Charles II. introduced silver cups in the place of bells. It was in Charles's time (1684) at the siege of Vienna by the Turks, that an interesting episode in the history of the Arab horse took place. A Turkish bashan and suite were captured, and three of their steeds were brought to England, on speculation, for sale to his Majesty. One of these horses is thus described: "A bright bay, two white feet, a blaze; such a head, eyes, ears, neck, breast, belly, haunches, legs, pasterns, and feet—in all regards beautiful, and proportioned to admiration; spirited, proud, nimble, making halt, turning with swiftness in so small a compass that was admirable to behold. With all this so gentle and tractable as called to mind a reproach to our grooms, who bring up their horses to retain their ill habits." They were shod in iron, the hoof covered, a hole being left open at the bottom. Charles and the Duke of York were delighted, and 500gs., 300gs., and 200gs. were the prices asked for them—a price, according to the value of money then and now, equal to that paid for our best racers. Some years after the introduction of these superb Arabs came the Darley and the Godolphin Arabians, and the English-bred Childers came upon the scene in 1715. What *he* did, how that he ran over four miles at a greater speed than our boasted flyers in the present day can cover five furlongs, is matter of history, and is fully chronicled in the deeds of the turf. Eclipse died in 1789; his heart weighed fourteen pounds. Have we had anything in horseflesh at all to be compared to these two half-bred Arabs? It is a hundred years since these deeds were done, and if they are to be attempted again new blood must be infused into our stock.

It is an error to suppose, as many do, that there is but *one* breed or class of Arab horse. There are two distinct breeds—one is the "Kadesha," or of unknown descent, and which does the drudgery of the country; the other is the "Kohlani"—that is, of ancient and noble pedigree, and used for riding only. It is of this noble pedigree that the Arab is so jealous, and very rarely can an animal be obtained from the sheiks. Europe owes little to the Arabs, but there are two things certainly we are indebted to them for—one

is our alphabet, and the other is the art of keeping a pedigree of a faithful and beautiful animal.—*Land and Water.*

THE CENSUS OF LIVE STOCK taken in 1880 shows that on the farms of the United States there were at that time 10,357,981 horses, 1,812,932 mules and asses, 993,970 oxen, 12,443,598 milch cows, 22,488,500 other cattle. 35,191,656 sheep, and 47,683,951 swine. The increase in percentage over the preceding census was: Swine, 90 per cent.; cattle, 66 per cent.; cows, 39 per cent.; mules and asses, 61 per cent.; horses, 45 per cent.; sheep, 24 per cent.; while oxen showed a decrease of 25 per cent. This census is particularly interesting to the veterinarian, as it indicates the field he has to work in and the tendency of farmers in the breeding of stock. According to this showing there is one cow to every four persons, about six sheep to every four humans. while swine are so numerous that nearly every man, woman and child in the country could have one apiece if they were divided.

A NOVEL CURE FOR HYDROPHOBIA.—A certain Dr. Sailor, Easton, Pa., had, during a long life, the reputation of preventing hydrophobia. Over thirty years ago, in my community, a boy was bitten by a dog, supposed to be rabid. He was taken to Sailor, who writing three words on a slip of paper, ordered the boy to eat it, in the meantime uttering some incantations (pow-wow) In three weeks symptoms of hydrophobia were thought to be manifesting themselves, but they passed off through the efficacy of the eaten paper! Now, unfortunately for the doctor's reputation, but fortunately for the credulity of the community, the dog had not been at once killed, neither had he died.

TROTTERS FOR NEW ZEALAND.—G. W. Griffin, the United States Consul at Auckland, New Zealand, sends a long letter to the State Department in relation to horse breeding in that country and the growing popularity of trotting there. He says: "Mr. J. J. Miller recently visited the United States, and while in Kentucky was fortunate enough to procure, among other fine horses, the celebrated trotter Contractor. Contractor was purchased for the sum of $6,000, and his safe arrival at Melbourne created much excitement. He is 15½ hands high, eight years old, and is regarded as a perfect gem. He possesses a good temper, and a good constitution, and his breeding properties are undeniable. He is an inbred Hambletonian, and is related to Dexter, George Wilkes, and St. Julien, and is said to show back to fifteen strains of the celebrated Messenger, the father of American trotters. Mr. Miller also purchased a very handsome Kentucky mare of a bright black c lor, called Tilda, by Mambrino Patchen, from Edwin Frost's mare, and sister to Rothschild, Silver Chief, and Hailstorm.

The Pacific Mail steamer City of Sydney brought to Auckland, on her last trip from San Francisco, eleven thoroughbred American trotters. These horses were purchased in Kentucky for Mr. Robert Wilkins, a gentleman residing at Christchurch, where it is intended to lay down a track. The following are the pedigrees of some of Mr. Wilkins' American trotters: Stallion Blackwood Abdallah, b. c., four years, by Homer, dam by Blackwood; bay colt, yearling, by Harold, dam by Belmont; bay filly, three years, by Messenger Chief, dam by Davy Crockett, Jr.; chestnut filly, three years, by Vanderbilt, dam by Hughes' Forest; bay filly, four years, by Garrard Chief, dam by Kolmell's Belshazzar; bay mare, five years, by Tom Stamp, dam by Bourbon Chief; brown mare, four years, by Mambrino King, dam by Flying

Cloud. The enterprise at Christchurch, like that of Victoria, is being watched with no little anxiety, and in the event of success, which very few now question, there will, of course, be other and larger importations of this kind of horses from the United States, the home of the fastest trotters in the world. Indeed, there is every reason to believe that the importation of American horses to New Zealand will prove in the near future a very profitable business. Those that arrived here have attracted no little attention. Many flattering notes have been given them in the newspaper press, and the Auckland *Herald* says that these Kentucky trotters mark a new era in the history of stock-raising in New Zealand."